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# **Electrical Contracting**

*With Which Is Consolidated*  
***Electrical Record***

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**Explosion Proof Wiring in  
Class I Locations**

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**Winter Sports Lighting**

•

**Problems of the Industrial  
Electrical Contractor**

•

**The Inspector's Opportunity**

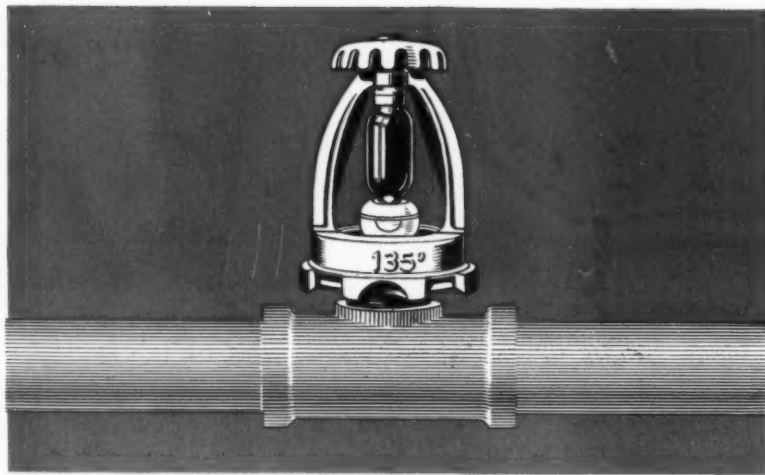
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**Pull Box Size Calculations**

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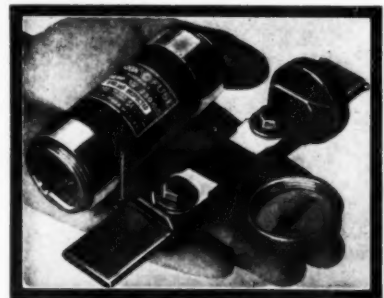
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**Jefferson Electric Company**  
Bellwood (Suburb of Chicago) Illinois



Simple, rugged, the Jefferson knife-blade type Fuse withstands repeated blowouts and is speedily renewed.

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# JEFFERSON UNION RENEWABLE FUSES

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VOLUME 33  
NUMBER 1

# electrical contracting

WITH WHICH IS CONSOLIDATED ELECTRICAL RECORD  
S. B. WILLIAMS, EDITOR AND GENERAL MANAGER

PUBLISHED MONTHLY

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## CONTENTS FOR NOVEMBER, 1933

John Wise .....	5
Problems of the Industrial Electrical Contractor by D. B. Clayton.....	6
Winter Sports Lighting by J. A. Summers.....	8
Pull Box Size Calculations by Ray Ashley.....	10
Explosion Proof Wiring—II by C. W. Gustafson	12
The Larger Opportunity of the Inspector by S. B. Williams .....	15
Tubular Bus Wiring .....	17
Editorials .....	18
Code Chats .....	20
N. E. C. A. News.....	26
Contracting News .....	30
Manufacturers News .....	40
Index to Advertisers.....	44

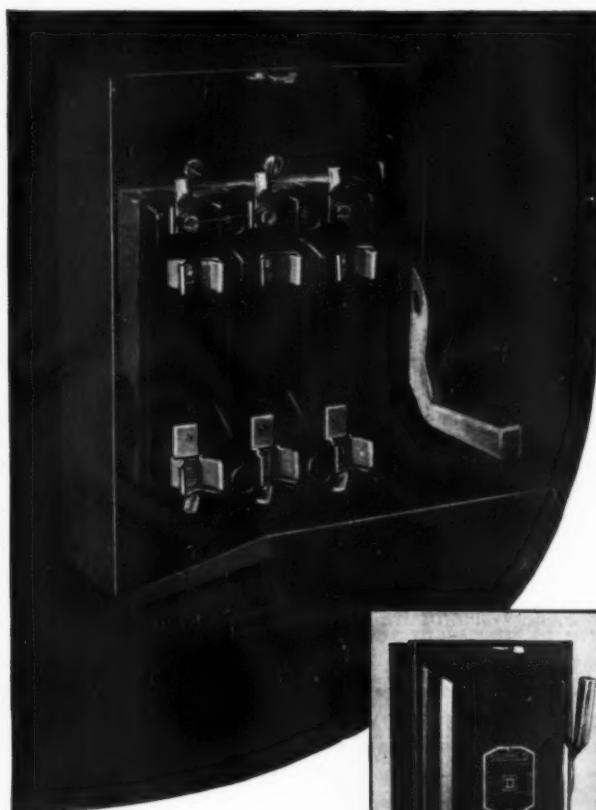
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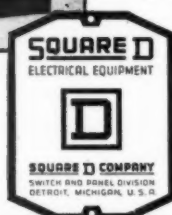
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The New Square D Switch  
"50,000" Series

- ... Gives More Space
- ... Saves Wiring Time
- ... Lowers Costs
- ... Improved Contacts—  
Always Cool



## SQUARE D COMPANY

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DETROIT, MICHIGAN, U. S. A.

BRANCH SALES OFFICES IN ALL PRINCIPAL CITIES



# A New S. E. D.

THE electrical industry's only national cooperative effort came to an end last month when the Society for Electrical Development closed its doors. It had been in operation twenty years.

IN royalist days when a king died, the public shouted, "The king is dead. Long live the King!" Unfortunately, however, when associations die there are not always new ones to take their place. The place of the Society is vacant—and it should be filled.

An industry with so many different elements, yet with a common goal, needs some meeting place. The Society for Electrical Development was supposed to provide this forum.

This industry forum should be more than a place where differences are adjusted. It should be the place where the industry unites on common problems, be they matters of policy or markets.

AS we review the accomplishments of the Society for Electrical Development we find much that has been of great value to the industry.

In its early years the Society conceived its major job to be publicity and in that connection promoted National Electrical Week each year, wrote or provided authoritative electrical articles for magazines and newspapers on the uses of electricity, promoted electrical pages and electric supplements in newspapers, acquainted the public with all of the then known uses for electricity.

The next phase was market development which, through a number of separate groups in the Society, made manufacturers and others conscious of the need for coordinated marketing and sales promotion. This phase also brought the Red Seal Wiring movement and the electrical league activity.

The final phase, that of industry regulation through control being vested in the industry's national associa-

tion executives, came too late. It was hoped that by this coordination a forum would have been created. Too many antagonistic points of view and jealousies had developed, however, to make this feasible at the time.

A NEW setup is greatly to be desired which can be harmonized with the other associations and which can provide national coordination.

Today, for instance, an industry forum would help greatly to iron out the intra-industry N. R. A. code differences.

A place is needed where the industry can formulate a policy on the National Electrical Code, iron out differences and eliminate the bitter battles with which Code revision meetings have sometimes been enlivened in the past.

A place is needed when any branch of the industry can bring its promotional programs and secure the support of the entire industry.

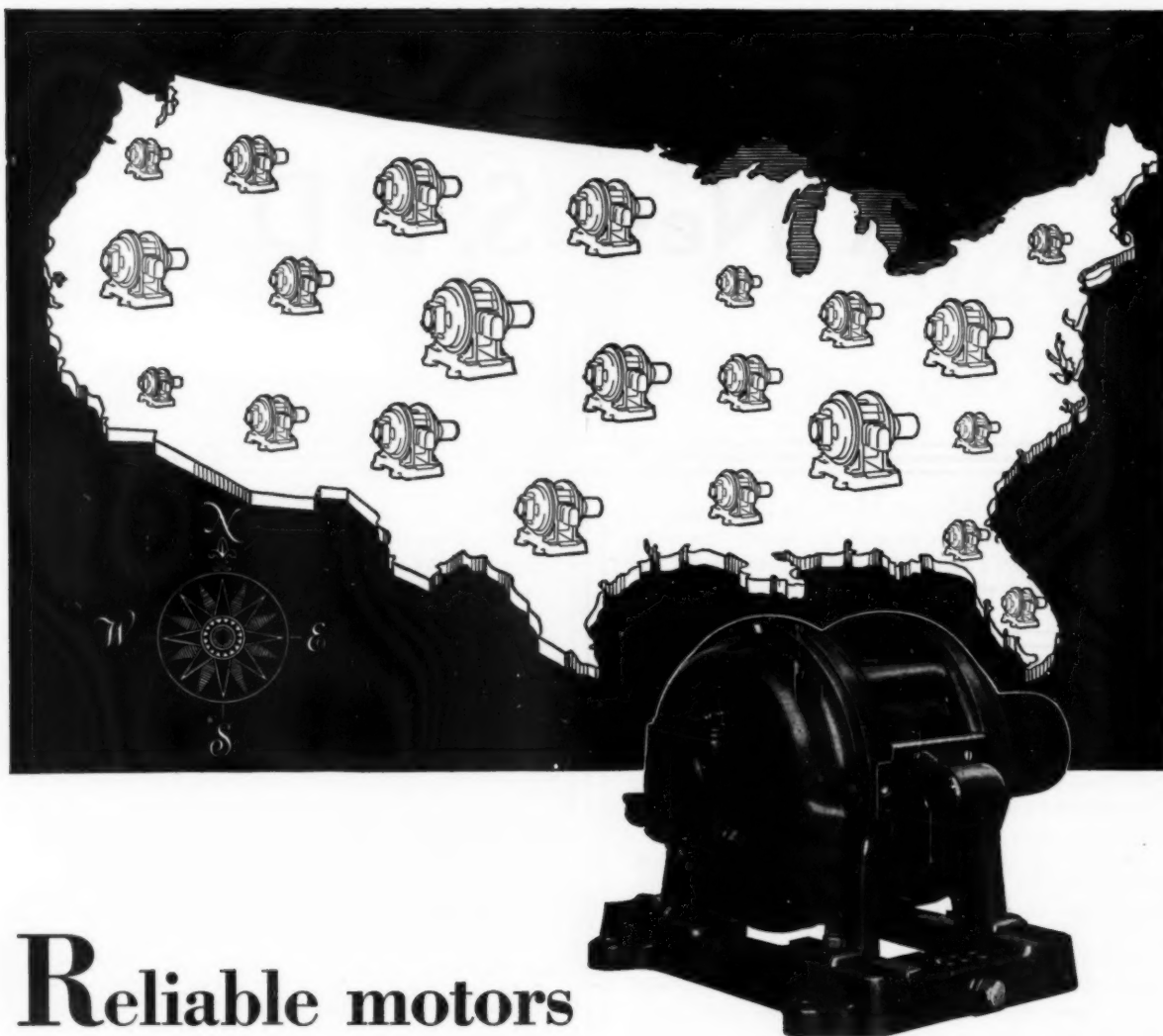
A place is needed where the industry can map out its market development policy and objective and where market tests can be formulated and worked out.

While these are but a few of the things which such a national body can do, they show the character of the work to be done.

THE organization of a new Society (for want of a better name at the moment) will probably have to be different. The scheme of individual company memberships took too much of the time of the staff in selling and renewing memberships.

It would be wrong to attempt to revive this work with anything like its former budget. A small staff, modest budget and a definite program that can be accomplished should be sufficient for the start.

It is far better to start small and build up. People have confidence in organizations that do things, no matter how small they are.



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Electrical contractors know how good General Electric motors and control are. They know that these motors give their customers good—dependable—efficient service. Ⓒ, Graybar's nationwide distribution service on these motors is equally good, equally dependable, equally efficient. It brings you just the motor or control you want to meet your customer's requirements. And it makes these motors—or any other electrical product—readily available by maintaining a warehouse in your own vicinity.

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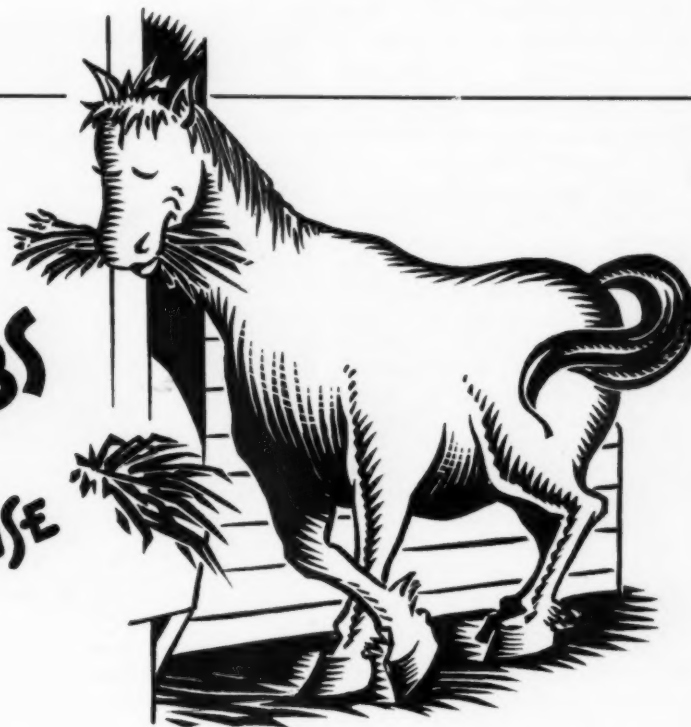
VOLUME 33  
NUMBER 1

# electrical contracting

WITH WHICH IS CONSOLIDATED ELECTRICAL RECORD

NOVEMBER  
1933

## down with the CORNCRIBS BY JOHN WISE



I was week-ending with some relatives on their farm some time ago, and while I was out in the barnyard with Uncle Charlie, a big, fine-looking horse meandered up to the water-trough. "Gee whizz!" I exclaimed, "What a horse! He's built like a brick stable!" Uncle Charlie is one of the kindest and best-natured men I know, but this time he gave me a dirty look and a dirtier laugh. "Yeah?" he snarled, "You mean he's built like a blank-blanked corncrib! And that's exactly what he is, the big, fat, lazy stiff!"

I guess I looked plenty dazed, for Uncle Charlie poured out one of his Santa Claus laughs then, and went on to explain. "You see, John," he said, "Horses and mules are by no means all alike; some are good for anything and some are good for nothing. Bill here is the kind that eats hearty, sleeps like a top and feels fine, but has no desire for work. He's always first in the mess-line, and eats half again as much as any animal I've got, but when it comes to work he's got three speeds—slow, slower and stop. In other words he's what we farmers call a 'corncrib,' only good for storing grain."

Knowing Uncle Charlie to be a good farmer, I naturally asked why he kept such a horse. "Well, in the first place, I'm like the woman who spends a lifetime trying to reform a drunken husband, just won't give up the fight,

and in the second place, everybody's wise to Bill and I can't sell him."

That set me thinking right away about the contracting industry in general and my own business in particular, as nearly every incident like this one has a lesson. I think I've kept as close a check as the next one, but I've had corncrib trouble all my life, though I must admit it's easier to get rid of 'em in our business than on a farm.

The corncrib, or non-producer, in contracting, isn't necessarily a human being, though we've all had that kind. It may be a system that costs more than it's worth, obsolete or excess stock, waste or unnecessary space, an automobile, or even an added department that looked fine in prospect but lousy in the ledger. Any feature in your business set-up that does not pay for itself comes under this head.

The point is that we are engaged in a prosperity movement which calls for plenty of action by all concerned and demands pretty close to 100% efficiency. Therefore, no contractor can afford to be supporting any corncribs while he's increasing his overhead to keep step with the Blue Eagle.

*The best treatment for cancer is removal.*

# Problems of the Industrial Electrical Contractor

By D. B. Clayton

Birmingham, Ala.

President, Southeastern Industrial Chapter  
N.E.C.A.

**T**HERE has come into existence in the past twenty years a very important group in the electrical contracting industry—the industrial contractor.

Members of this group have devoted the greater part of their time to studying the wiring and motor problems of industrial plants, each of which, as a rule, has its own peculiarities of drive and control. Ignorance of plant owners as to electrical requirements naturally caused them to turn to the electrical engineer and the experienced contractor, resulting in a profitable business for these, and the best designed and most efficiently installed wiring system for the plant.

After devoting years to this class of work and to the building up of an experienced organization familiar with the special problems encountered in the various plants, the contractor has recently found himself faced with the loss of a great part of this work, and is having difficulty securing enough to keep even a skeleton organization partially busy. There must be a reason for this.

The National Industrial Recovery Act, regardless of what else it may accomplish, can be thanked for imposing upon industry a forced self-analysis of a very thorough nature, something that has long been needed. From this self-analysis each branch of industry cannot help gaining some valuable information, and through the cooperation of all branches, guided by NRA codes, a great permanent good should result.

As a result of such self-analysis the industrial electrical contractor has become firmly impressed with the fact that his is a most unenviable position in the electrical industry today, not so much because of the lack of business, which is a condition of the industry as a whole, but for reasons

that are seriously affecting his future place in the picture.

While these observations have come primarily from the Southern and Southeastern territories where industrial conditions are rather peculiar, conversations and correspondence with contractors in other sections indicate that the observations apply with equal force elsewhere.

## Major Causes

Careful study discloses three chief reasons for present conditions:

1. Actual lack of work being done during this period of economic readjustment.

2. Increasing tendency on the part of owners to handle their own work.

3. Destructive competitive conditions within the industry itself.

The first, we hope, is temporary. The second and third may become permanent without some prompt action.

Several elements enter into the decision of owners to handle their own work. When the plant is put in operation they organize a maintenance crew to keep up the electrical system. With the system installed by a good contractor, owners have so little trouble with it that they lose the awe they felt concerning its technical difficulties, and decide that their own crews are capable of handling new work properly.

These crews may consist of one man or more than a hundred, but in any case they are repair men, usually slow, and generally more or less unskilled as first class construction men. They work in a haphazard way and seldom finish a piece of work, because they are called away from it for maintenance work.

With a plant electrified, wholesalers and manufacturers have called on

the purchasing agent and the electrical foreman for the purpose, so they tell us, of introducing new devices and apparatus. Once they are in the plant the wholesalers and manufacturers proceed to sell any materials they can, usually at the contractor's price, thus eliminating any possibility of a sale by the contractor.

If necessary to obtain the order even at those prices, the manufacturer and wholesaler suggest that the plant can save money by having its own crew handle the work. This practice has become common, though I will say frankly I do not believe it is because the manufacturers and wholesalers desire to eliminate the contractor from such work, but simply because they have all wanted to hog the business where, by any means, it was possible.

This can be illustrated by an actual case I have in mind.

Two contractors, Jones and Brown, operate in a town where there are two jobbers, Smith and Burns. Jones buys most of his materials from Smith. Brown buys mostly from Burns. When Jones secures a wiring job, Burns, feeling he has no chance to get the materials order, follows the short-sighted policy of going direct to Jones' client and trying to sell whatever he can. When Brown gets a wiring job, Smith decides that the only way he can get back the business Burns got direct on the other job, is to go to Brown's client and sell whatever he can. Thus the wholesalers fight each other, securing business they have no right to, having to take it at a low price to get it, with each wholesaler losing an equal amount to the other on the same basis. The contractors have been robbed of a legitimate profit on this material, and the wholesalers



have the same amount of business at a lower price—an inexcusable loss for the industry.

It requires no prophet to forecast the results of conditions where the owner can buy materials at the contractor's costs, pick up a few low-priced, semi-skilled men to add to his crew, and thus save, as he thinks, the cost of the engineer, the profit of the contractor, and part of the wages of the "high-priced electricians" that the contractor uses.

### Competition

In the boom days a number of contractors entered the industrial field or branched out from some other line, many of them without experience or ability properly to handle work of the character required. For a while they were able to exist. Some made money. Others even then were losing money, because they were not known in the industry, and secured work only where their price was so much lower than the recognized contractor's price that the owner's desire to save a substantial sum outweighed the better judgment which told him he would probably not get, from the inexperienced contractor, even what he paid for.

As volume fell off, prices dropped in the fight for what little business there was. Responsible contractors had to lower their prices to meet the competition of inexperienced contractors, as the owner's desire to save money became so keen that it dimmed his better judgment.

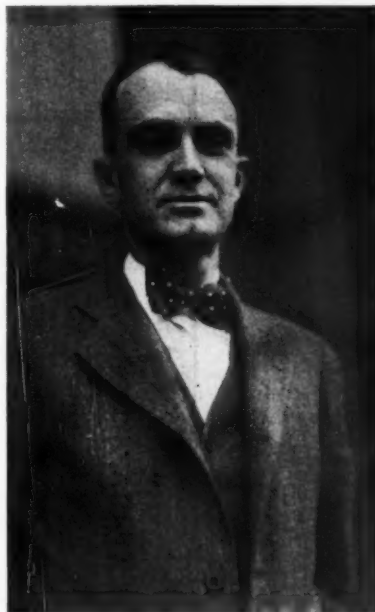
### Low Prices

Conditions finally reached the point where work in many cases was bid at cost prices knowingly, and below cost in many cases unknowingly, due to anxiety in having a close estimate. The only hope was a "break" on the job to allow a little for that ever-present overhead, but it usually turned out to be "broke," and the wholesaler received the first jolt, which was later to be distributed to us all, as losses always are.

Thus was an industry poisoned. We hope we have at hand a partial antidote for these conditions, common to business as a whole now, in the NRA codes. Our business morals have been shattered in the battle we have been through. We look for a tonic for them in the Codes of Fair Competition which the Government is

going to help us to enforce until our morals have reached a point where they can resist attack of their own accord.

Until that time, however, properly promulgated codes for each industry, intelligently administered, will go a long way towards repairing much of the damage done to the industrial electrical contracting industry. Fairly



D. B. Clayton

written codes for NEMA and NEWA, outlining differentials for the various classes of purchasers—wholesalers, contractor-dealers and consumers—will place each class back where it economically belongs; will create a spirit of cooperation among the three distributing and servicing groups in place of the watchful suspicion now existing; and will put into operation the logical and orderly flow of electrical materials and apparatus from the manufacturers to the consumers, with each group properly and profitably rendering the service for which it exists economically.

A fair code for NECA will protect contractors as an industry against unfair methods of competition practiced by that "ten per cent" among them who are cutting prices through ignorance or malicious selfishness, and will place them in a position of fairness as to labor conditions, a thing now affecting them and their workers seriously.

Given reasonable minimum wages and maximum hours for everyone who does electrical construction work, including the owners, one of the great incentives for handling plant work by the owner's force disappears.

In the past owners have used their maintenance men on construction work, giving them a number of usually unskilled, low-priced men as help, spent the necessary time to get the work in a passable condition—and there, usually, it has stayed until the crew got back from a maintenance job to finish it. And it is seldom finished.

### Equal Wages

When the owners have to pay electrical workers' rates, the majority will prefer to have the work done properly, by competent workmen under the direction of an experienced contractor who, the owners know, has the ability and responsibility to insure the highest class of work and relieve them of any trouble and responsibility.

When the owners have to pay consumers' prices for materials, and fair prices for the labor necessary to install them, then two of the chief troubles of the contractor will be overcome, and he can use salesmanship to secure work that he has been losing, in recent years, in a steadily increasing volume.

### Profits Justified

The experienced contractor can very easily justify his profit on a job, when savings to the owner are considered in estimating and buying materials, in better scheduled and more efficient use of labor, and in the more economical handling of changes in layouts after the work is started. The contractor is in a better position to handle materials that are left over, which in some cases amount to a considerable sum; and he is able to estimate more accurately to start with.

The one important task ahead of us now is the working out of the proper relationships of the manufacturer and wholesalers, and convincing them that their interests and those of the contractor are parallel. Approach those in these two groups that you trade with. Show them what they will have to do before the best customers they have—the contractors—can solve some of the problems now confronting them.

### Neighborhood Backyard Rink

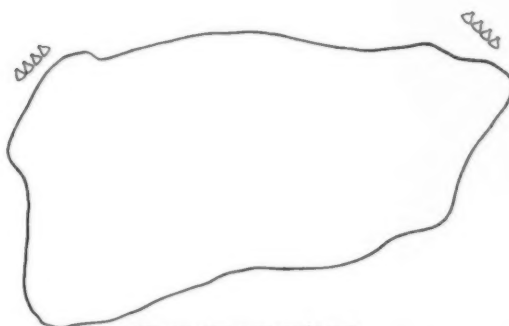
One-tenth to one-fourth foot-candle recommended.

Lighting accomplished through use of one or two handy floodlights of the 100- or 200-watt size, depending on rink.

Units should be located on convenient tree or building.

Mount units 20 to 30 ft. high.

In general, the units should be placed on the same side of the pond, one at either end.



APPROXIMATE SIZE 200' X 600'  
1000 WATT MEDIUM ANGLE FLOODLIGHTING PROJECTORS.

### Community Rinks

Where admission is charged, a higher intensity of illumination is necessary in order to minimize accident likelihood and liability.

One to five foot-candles recommended.

The entrance should be lighted to an intensity of from three to five foot-candles.

The larger rinks usually require floodlighting projectors because of the length of throw. They should be placed so that direct or reflected glare is not intolerable along the skating course. Glare is avoided by throwing the beams across the line of skating, rather than in direct line with it.

The number of projectors will depend on the size of rink and may easily be calculated from the following formula:

$$\frac{A \times I}{\text{Lumens in Beam}} = \text{Number}$$

A is the area of the pond

I is the intensity

Lumens in the Beam are secured from the manufacturer's catalogue.

Wide angle floodlighting projectors or large open type reflectors recommended.

Five hundred to 1000-watt lamps recommended.

Mount a minimum of 30 ft., and as much higher as possible.

## Winter Sports

Of the many winter sports indulged in and enjoyed by all, skating is perhaps the most popular. The rinks differ in size, character and clientele from the backyard type, to the local Country Club rink.

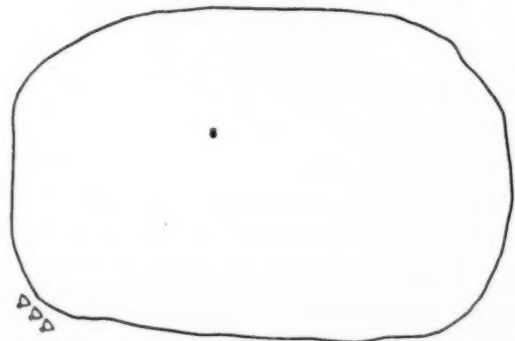
The lighting requirements which vary for each of these types are here outlined.

### Curling

This sport is played on rinks 126 ft. long and 16 ft. to 18 ft. wide, although these dimensions may vary depending on local conditions. Five foot-candles recommended. Light should come from side in order to eliminate reflected glare from the ice, which hinders player from seeing curling irons.

Open type reflectors or wide angle floodlighting projectors are satisfactory. These should be located in two banks opposite the hog score and equipped with one or two 1000-watt lamps, depending on the number of rinks to be lighted.

Recommended mounting height—30 ft.



3-500 WATT MEDIUM ANGLE FLOODLIGHTING PROJECTORS

### Flooded Tennis Courts and Football Fields

One-fourth to one foot-candle recommended.

Lighting accomplished through use of two to four units equipped with 500-watt to 1000-watt lamps, depending on size of field.

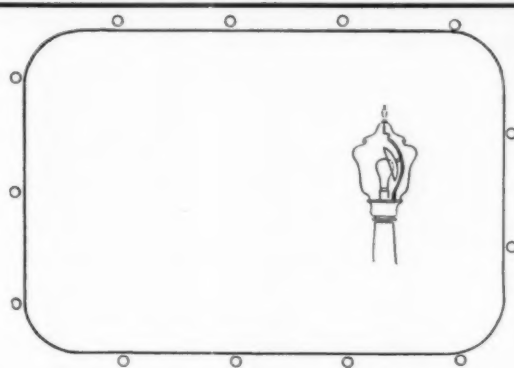
Wide angle floodlighting projectors or large open type reflectors recommended.

Units should be located on 30-ft. poles on the same side of rink near opposite ends.

# Lighting

By J. A. Summers

General Electric Company  
Nela Park Engineering Department  
Cleveland, Ohio



500 WATT COMBINATION STREET AND FLOODLIGHTING UNITS.  
SPACING - 100 FT. MOUNTING HEIGHT - MINIMUM 20 FT.

## Country Club Rink

In the lighting of these rinks considerable stress is placed on the aesthetic aspects of the lighting. And, in addition, a high level of illumination is usually required in order that fancy skating events, etc., be readily seen by spectators.

Three to five foot-candles recommended.

Ornamental poles 30 to 40 ft. high are recommended for the large rinks.

Wide angle floodlighting projectors do an excellent job.

Ornamental street lighting standards with combination street lighting floodlighting units are frequently used for the small rink.



## Toboggan Slides

These courses are usually circuitous. For satisfactory lighting, it is recommended that one 500-watt narrow angle floodlighting projector be located at the take-off and the the curve, and a little ahead of the curve. Such a location makes it possible for the steersman to see the curve in plenty of time for its successful execution.

If slide is of the straight-away type place one 500-watt narrow angle floodlighting projector every 300 ft., and directed along runway. The projector should be mounted at least 15 ft. high.

Equip units with 500-watt lamps. Units should be spaced 100 ft. apart around the entire rink, mounted at least 20 ft. high.

In the past, overhead units suspended from messenger cable have frequently been used for rink lighting. The resultant illumination is very good but such a method is not recommended because in bad weather the water and slush which drips from the units causes rough spots on the ice. It is desirable to keep the lighting units outside of the skating area.



## Hockey Rinks

These rinks are not of standard size. The average rink, however, should be lighted to an intensity of at least 10 foot-candles. This is accomplished by means of four 1000-watt lamps in large open type or wide angle floodlighting projectors. Units should be placed as close to the rink as possible, and as high as possible in order to reduce the length of the shadows. Forty feet is the recommended distance.

For indoor rinks, where there is usually a large audience, intensities as high as 70 foot-candles have been used.

# Pull Box Size Calculations

By Ray Ashley

THE necessity for carefully providing the proper number and sizes of pull boxes is not limited to the large jobs alone. The percentage of loss is greater on small jobs which require boxes almost as soon as the job is started. The contractor for small installations should have his work carefully laid out ahead of time so that the boxes can be ordered and delivered with the conduit.

Trying to avoid delays while waiting for pull boxes is often the cause of conduit fittings being used where boxes belong.

Regardless of whether one or fifty pull boxes are required, a good contractor will begin planning their design as soon as possible. It is better to have them on the job a week ahead of time than a day late.

In localities where the contractor may have difficulty in getting delivery, it is well to have a few stock boxes on hand. In some cases it has been found profitable to have a small stock of sheet metal and angle iron. The angle iron is ordered with holes punched on 4-in. centers. When a box is needed the material is cut to size and bolted together.

While the tendency is to get boxes too small, experienced contractors appreciate the amount of room required for economical construction. There is a great deal of difference between the labor cost for pulling cable

WIRE—R. C.				RECOMMENDED MINIMUM BOX DIMENSION FOR RIGHT ANGLE TURNS		
Size B.S.G. & C.M.	Ampere Capacity	Overall Diam.	15xOverall Diam.	1 Wire	2 Wires	3 Wires
No. 6	50	0.44 in.	6.6 in.	5 in.	5 in.	6 in.
No. 4	70	0.48	7.3	6	6	8
No. 2	90	0.52	7.7	7	8	10
No. 1	100	0.61	9.1	8	9	11
No. 0	125	0.63	9.4	9	11	12
No. 00	150	0.66	9.8	10	11	13
No. 000	175	0.72	10.8	11	12	14
No. 0000	225	0.77	11.8	11	12	16
250,000	250	0.91	13.5	12	14	16
300,000	275	0.94	14.1	12	14	18
350,000	300	1.00	15.0	14	16	18
400,000	325	1.05	16.0	14	16	18
450,000	360	1.10	16.5	15	18	20
500,000	400	1.15	17.3	16	20	20
600,000	450	1.28	19.2	16	20	22
650,000	475	1.31	19.7	18	22	22
700,000	500	1.35	20.0	18	22	22
750,000	525	1.37	20.6	18	22	24
800,000	550	1.41	21.1	18	24	24
850,000	575	1.47	22.0	20	28	26
900,000	600	1.50	22.5	20	26	26
950,000	625	1.53	23.0	20	28	28
1,000,000	650	1.56	23.5	22	26	28
1,250,000	750	1.72	25.8	22	28	30
1,500,000	850	1.88	28.2	24	30	32
1,750,000	950	2.00	30.0	24	34	34
2,000,000	1050	2.10	31.5	24	36	38

[The minimum space required for turning cable at right angles is approximately fifteen times its overall diameter. Note in the above table how closely the results obtained in this way correspond with the minimum recommended box size.]

through a box which is too small and that for pulling through one that has been liberally designed. Yet the difference between the cost of the boxes is very small.

There is no set rule for determining the sizes of boxes. For making right angle turns, some engineers recommend using the over all dimension of an elbow corresponding in size to the largest conduit entering the box, as the minimum dimension of the box. This rule works very well for 3-wire feeders which have all of the cables in the same conduit. For direct current feeders which have a separate conduit for each cable, a dimension arrived at by following this rule may be found to be much too small. Take for example a 2-wire feeder having one 1,000,000 cm. cable in a 2-in. conduit per leg. The over-all dimension of a 2-in. conduit elbow is approximately 13 in. Allowing 3 in. additional for the second 2-in. conduit would give 16 in. as the space required in a box for making a right angle turn. It is ob-

vious that such a box would be entirely too small.

In making up tables or designing particular boxes, the over-all dimension of the cables to be used serves as the best guide. The accompanying table shows how closely the result of multiplying the over-all dimension of a cable by 15 comes to being equal to the minimum box dimensions required for making right angle turns. One could set up a universal rule of using a minimum dimension of 15 times the over-all size of the largest cable plus the size of the conduit serving it. The addition of the conduit dimension would compensate for difference in space required to make a turn with a single or multiple wire group. Although this would not always give exactly the best size the difference would not be serious.

The straight through pull requires a box with a length approximately 50 percent greater than the recommended dimension for making turns. The width for single feeders is correspondingly less. A single 3-wire

*Electrical Contracting, November, 1933*



feeder of 500,000 cm. cable would require a box 20 in. by 20 in. for making a turn and a box 14 in. by 30 in. for a straight through pull. The width is an arbitrary dimension selected to allow space for handling the cable. It will be found that for good construction the area of a straight through pullbox is very close to that for one used in making turns with the same size feeder. A 20 in. by 20 in. box has 400 sq. in., while a 14 in. by 30 in. box has 420 sq. in. Again take the requirements for a 3-wire 100,000 cm. feeder; a 28 in. by 28 in. space would be required for making a turn and a space of 18 in. by 42 in. would be required for a straight through pull, the area of the two boxes being 784 sq. in. and 756 sq. in. respectively.

The depth of a box should be at least twice the over-all diameter of the largest conduit or five times the diameter of the largest cable. The depth, like all other dimensions, had better be too large than too small.

#### Additional Feeders

The above discussion has been limited largely to single feeder runs. If several feeders enter the same box, the first thing to be considered is the space required for the largest cable. Using the dimensions required for the largest cable as a basis, add the space required to accommodate the conduits entering the box for other feeders. A box having two No. 000 3-wire feeders each in a 2 in. conduit, and one No. 6 3-wire feeder in 1 1/4 in. conduit, all making a right angle turn, would be figured as follows, all conduits being in the same plane:

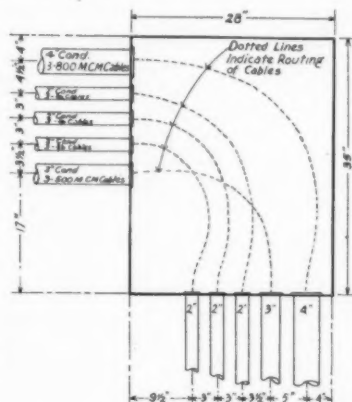
Taking the dimension of 14 in. (previously established for No. 000 cable) as a base, add 3 in. for the additional 2-inch conduit and 2 1/4 in. for the 1 1/4-in. conduit, making a total of 19 1/4 in. This gives the dimensions of the box in the plane of the conduits. As boxes of this size are usually made in even inches the desirable size would be 20 in. by 20 in.

The depth of the box would be at least 5 in. which is approximately twice the outside diameter of a 2-inch conduit.

Every contractor should have a carefully prepared table of dimensions for spacing conduits. Where tables are not available, a rule outlined in the April, 1932, issue of the *ELECTRICAL CONTRACTING* may be used. This recommended adding 1

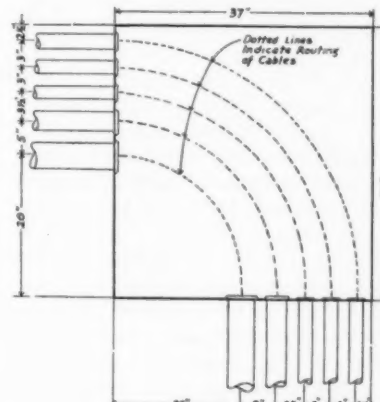
in. to the nominal size of the conduit up to and including 2 1/2-in.; 1 1/2 in. for conduit from 3-in. to 4-in. inclusive, and 2 in. for conduits above this size.

Due to cramped conditions or for various reasons it is often necessary to keep the size of boxes down to a minimum. In cases where several feeders are changing direction in the same box, the arrangement of the



to locate a box at the offset. By offsetting the knock-outs it serves a double purpose.

Again, by studying the building measurements, one may be able to design boxes so that he can work full lengths of conduit, and keep cutting down to a minimum. A building may have risers with junction boxes on each floor for connection of future tenant panels. Let us assume that



The size of a pull box is very often affected by the position of the feeders entering it. Locating the large feeders on the outside of a right angle turn may greatly reduce the size of the box without involving extra labor at their point of origin or point of termination.

feeders may materially affect the size. If possible the large feeders should be on the outside of a right angle turn. If all the feeders are large, space may be saved by reversing their position. The feeders entering the box on the inside of the turn can be shifted so that they leave on the outside and vice versa.

There are a great many things to be considered, before designing a box in which the feeders are to cross over. In the first place many engineers will not permit the use of pull boxes for crossing over the cables. The box will have to be deeper because the cables do not lay side by side. Besides the termination of the feeders must be considered. One may gain by crossing the feeders at a box, only to find that he has gotten into difficulty when he goes to terminate the run. At best, the use of pull boxes at right angle turns is expensive and should be avoided whenever possible.

The economy in the use of pull boxes is not limited to design only. A saving in labor is often effected by exercising care in the location of boxes. In long runs where boxes are needed, there may be an offset in the conduit. It may be found practical

it is 12 ft. from floor to floor. By making the boxes 25 in. high, full lengths of conduit could be used.

Any job may present a new possibility for labor saving, or show mistakes that are being made. The only way to be able to take advantage of these possibilities, and to avoid repetition of mistakes, is to closely follow the distribution of labor costs. A contractor who studies his installation costs carefully soon comes to realize that pull boxes are a phase of the work which may be a good or bad investment.

#### 1933 CODE APPROVED AS AMERICAN STANDARD

Announcement is made by the American Standards Association that the 1933 edition of the National Electrical Code has been approved as an American Standard. The new Code which supercedes the 1931 edition carries the line "Effective November 1."

The announcement of the Standards Association stated that the Code was now the basis for wiring regulations in some 2,200 communities in this country.

# Explosion Proof Wiring—II

## Electrical Installations in Class I Hazardous Locations

By C. W. Gustafson,  
Chairman Article 32 Committee, N.E.C.

IN the preceding installment of this series we discussed the general division of Article 32 of the National Electrical Code into four classes. It will be remembered that in Class I was placed those locations where flammable volatile liquids, highly flammable gases, mixtures or other highly flammable substances are manufactured, used, handled or stored in other than their original containers. In order that the engineer or inspector be better qualified to determine where and to what degree the hazards represented by these materials are present, some knowledge of the various substances and their characteristics will prove useful.

**Flammable Volatile Liquids.** Liquids of this class are many and find wide use in a variety of processes and industries. In this class comes gasoline, lacquer solvents, cleaning fluids and many others familiar to the inspector. Some of these liquids assume the vapor state very readily and at relatively low temperatures. For any liquid there is a temperature below which it will not assume the vapor state in dangerous quantity and this temperature is known as the flash point of the particular liquid concerned. As an example, gasoline (74-76 A.P.I.) has a flashpoint of -45 deg. F., which means that at temperatures as low as 45 deg. below zero flammable vapors will be given off in dangerous quantities. The tendency to evaporate increases with increases in temperature and hence a liquid with a relatively high flash point may, under some conditions, such as when the processes require heat, become quite hazardous. As a borderline example, consider kerosene, which is assumed to have a flashpoint of 100 deg. F. Under normal conditions of tempera-

ture, kerosene then would not be greatly hazardous, but in locations or processes where the temperature exceeds 100 deg. F. this liquid becomes really hazardous.

In the case of most flammable volatile liquids there is a minimum as well as a maximum concentration of vapor in air below and above which propagation of flame does not occur on contact with a source of ignition. These concentrations are known as the lower and upper explosive or flammable limits and are usually represented in terms of percentage of vapors in air by volume. Between the lower and upper limits there is a certain concentration that will produce the most intense combustion or explosion of which the vapor is capable. It is this concentration that we attempt to obtain, for instance, when we adjust the carburetors of our automobiles. The difference between the lower and upper limits is known as the flammable or explosive range. As an example, gasoline has a lower explosive limit of 1.4% and an upper limit of 6% giving a range of 4.4%.

The behavior of a vapor when released is determined by its vapor density, which is nothing more than the comparison in weight of a given volume of vapor with that of the same volume of air under similar conditions. Thus, gasoline has a vapor density of 3.5, that is, it is 3½ times as heavy as air and, therefore, has a tendency to seek the lower levels in a room unless distributed by air currents or other agencies.

Various vapor and air mixtures require igniting agencies of certain temperatures to produce combustion which will propagate itself. The lowest temperature at which this occurs is known as the apparent ignition

temperature. For gasoline vapor and air this temperature is 536 deg. F.

From the standpoint of the inspector, factors such as explosive limits and vapor densities need not be given consideration in judging a hazardous location as he has no assurance that the vapor and air mixtures will be above or below the flammable limits, nor does he know positively that because a vapor is heavier than air that it will under all conditions remain in the lower level of a room. While consideration of ignition temperature is important in the case of motor frames, apparatus enclosures and heaters, it should be kept in mind that we are dealing with an igniting agency having a temperature of from 6000 to 7000 deg. F., that is, an electric arc. However, the flashpoint of a flammable volatile liquid is important in determining whether or not a certain premise should be judged as being hazardous. Under ordinary conditions then, liquids having a flashpoint of over 100 deg. F. should be judged as relatively non-hazardous unless heated.

Following is a list of the more prominent flammable volatile liquids and their approximate flashpoints:

Liquid	Flashpoint (Closed Cup) Deg. F.
Carbon Disulphide .....	-22
Ethyl Ether .....	-49
Gasoline .....	-45
Benzol .....	-4
Acetone .....	3
Toluol .....	46
Methyl Alcohol (C. P.) .....	52
Denatured Alcohol (Form No. 5) .....	61
Ethyl Alcohol (Abs.) .....	54
Ethyl Acetate (C. P.) .....	28
Turpentine .....	91
Kerosene .....	100
Amyl Acetate (Pure) .....	77
Amyl Alcohol (Fusel Oil) .....	100
Butyl Iso Alcohol .....	88
Petroleum Ether .....	-69

The so-called naphtha and benzine,  
*Electrical Contracting, November, 1933*

two commonly used liquids, are really forms of gasoline of lower boiling point and should be regarded as being approximately the same class as gasoline.

**Flammable Gases.** In this class we find a variety of gases used for various purposes. Flammable gases form explosive or flammable mixtures with air in the same manner as do the vapors of flammable liquids which we have previously discussed. The hazards of the two classes of matter are, therefore, quite similar from our viewpoint. It is, of course, not the intent to regard as hazardous locations all premises where flammable gases are used, as this would affect even ordinary dwellings. We are interested more in establishments where the gases are produced or are used as components of other manufactured products. Many of the flammable gases have wide explosive ranges and many of them have densities closely approximating that of air, thus making them more difficult to control.

Following is a list of prominent gases encountered in industry:

- Illuminating Gas
- Hydrogen
- Acetylene
- Ethylene
- Ethane
- Propane
- Carbon Monoxide
- Butane
- Methane
- Propylene

**Highly Flammable Solids.** In this class we may place many commercial solid substances which might better be called explosives. Gunpowder, dry picric acid, nitrocellulose, naphthalene and pyroxlin plastic are prominent examples of highly flammable solids which may be encountered.

In the more usual manufacturing operations, pyroxlin plastic, better known as "celluloid," probably represents the most hazardous material found. It is a material which is used to a great extent for the manufacture of many types of goods, including toilet articles, photographic film, artificial leather, billiard balls, piano keys, advertising novelties and a host of others. Its manufacture and use involves severe hazards for its ignition point is very low, probably in the neighborhood of 300 deg. F. and, therefore, may be ignited by a slight electric arc or spark, or even by the heat of an incandescent lamp. It

burns very rapidly and combustion is attended by the evolution of explosive and poisonous fumes or vapors. In some industries, scrap pyroxlin plastic, such as film cuttings and punchings, is purchased to be used for the preparation of other commodities.

**Highly Flammable Mixtures.** Many substances, in themselves non-hazardous, from the standpoint of ignition point and combustibility, are formed into hazardous products when low flashpoint solvents are used to place them in solution or to form a paste. When the process involves the solution of a hazardous material in an equally hazardous solvent, the resultant hazard is usually greatly multiplied.

As a representative mixture of the class first mentioned, we have rubber cement, which is usually a solution of rubber in gasoline or naphtha. This type of cement is used in many processes in the rubber industry, often in such a manner that the rooms in which operations take place have a very appreciable amount of gasoline or naphtha vapor present, necessitating adequate artificial ventilation and rigid precautions to remove sources of ignition. Of the second class a good example is afforded by pyroxylin lacquers which consist of pyroxylin or nitrated cotton, in itself hazardous, blended with the desired oil and pigments and mixed with flammable volatile solvents and thinners such as amyl acetate, acetone or butyl alcohol.

Many of the modern paint and varnish mixtures employ flammable volatile vehicles to promote quick drying. There are also many commercial mixtures on the market, such as varnish removers, cleaning compounds and others which entail hazardous conditions in their preparation if not in their use.

In the dry cleaning industry it will sometimes be found that the fluid or solvent used is referred to as a "safety solvent." Such solvents are usually "straight" carbon tetrachloride, a non-hazardous liquid, or a mixture of a flammable volatile such as naphtha or benzene and carbon tetrachloride, the latter being added to produce a fluid of higher flashpoint than naphtha or benzene alone.

#### Typical Class I Locations

It is impracticable to attempt to detail in the space available a complete

list of types of establishments in which Class I conditions prevail and to name exactly the extent of the hazardous area in each. Each establishment must be judged on its own merits by the inspection authority, as arrangement of buildings and equipment may greatly affect individual cases. However, the following brief and general discussion may be of assistance to the inspector in this regard. We shall name various types of normally hazardous establishments and suggest the extent of the hazardous area.

**Dry Cleaning Plants.** Hazardous area consists of washing, drying, and solvent recovery rooms or buildings. While it might be thought that special consideration should be given to plants using only non-hazardous solvents such as carbon tetrachloride or the special "safety" solvents, there is no guarantee that such "safety" solvents will always be used. Therefore these locations should always be considered as using hazardous solvents.

**Petroleum Refineries.** Practically all buildings to be considered as hazardous areas, except offices, shops, laboratories, warehouses, used solely for storage of lubricating oils and greases, and boiler houses. Special consideration to be given to electrical equipment about open stills and open wash and bleach towers, and also as to type of portable lights used in or about tanks.

**Bulk Oil Stations.** Hazardous area confined to interior of pump houses, although consideration should be given to type of portable lights used at tank cars and at loading or unloading racks.

**Filling Stations.** Hazardous area represented by interior of housing or pedestal of the discharge device or pump assembly and does not extend into station shelter and canopy. Greasing and oil changing pits, if present, should be regarded as hazardous area due to likelihood of presence of gasoline vapors.

**Gas Plants.** Possibility of leakage of gas present continually in process of manufacture of gas, especially in the condenser building, and in the rooms containing the purifiers and scrubbers, meters, governors and control valves. These should be regarded as Class I locations. In the retort or generator building there are generally open fires for heating these so there seems no good sense in asking that Class I rules be followed for electrical equipment installed therein. In the



case of natural gas, the pump or compressor houses, and the meter, governor and valve rooms should be regarded as Class I locations.

**Spray Painting Establishments.** This is associated with a number of industries including those producing automobiles, furniture, metal products and many others including even hats. In the case of the smaller manufactured articles, the process is usually carried out in a separate room cut off from the main plant by fire walls, in which event only that room need be considered a Class I location. When large articles, such as automobiles or railroad coaches, are spray finished this is not always practicable. In such cases the hazardous area is dependent on arrangement of spray booths if any, the nature of the ventilating system, and the degree of cleanliness. In general, the extent of the hazardous area in this case may be assumed to extend to a distance of from 10 to 25 ft. from the booth. The rooms in which the lacquers are mixed and stored should also be regarded as Class I locations. The hazard of spray painting varies with the type of lacquer or varnish used, the pyroxylin lacquer being the most hazardous due to the presence of a highly flammable residue as well as the vapors of a flammable liquid vehicle or thinner.

**Dip Tank Painting Processes.** These are used in many industries including automobile, furniture, electrical machinery, millinery, and others, and are usually conducted in a cut off room in which is also a drying oven or tunnel. The room, especially the area immediately around and over the dip tank and the interior of the oven or tunnel should be regarded as a Class I location. As before, the hazard varies with the type of finishing material used and with the arrangement of the equipment, nature of ventilation and degree of cleanliness.

**Chemical Works.** Owing to the extremely large variety of chemicals being manufactured and the many and varied processes employed, it is impracticable to include here anything more than mere suggestions. Each chemical plant should be studied individually, paying particular attention to the nature of raw materials, processes and the materials produced. Wood distillation and coal tar plants, establishments producing the various alcohols, and those manufacturing various chemical solvents such as ethyl acetate, ether and others, should

be scrutinized carefully. Many smaller establishments producing miscellaneous industrial chemical preparations such as shoe dressings, varnish removers, cleaning fluids, insecticides and others make use of flammable solvents. The same is true of factories producing pharmaceutical chemicals, fruit essences and perfumes. The extent of the hazardous area in each may be determined only by thorough study and the use of good judgment.

**Paint and Varnish Factories.** Paints and varnishes are of a number of types and the hazards attending their preparation are dependent on the type of thinner used. The thinner may be no more hazardous than turpentine, but often naphtha, benzene, alcohol or acetone are used, thereby greatly increasing the hazard. In ordinary paints and in rosin or shellac varnishes the hazard, from our viewpoint, is represented by the presence of vapor of these volatile flammable thinners in the room where the thinners are added, where the finished product is placed in containers and in the rooms or compartments containing pumps used to convey the thinner from storage tanks to mixing tanks. Pyroxylin varnishes, or lacquers as they are more frequently called, are made by dissolving pyroxylin in a solvent such as amyl acetate. To this solution a thinner such as benzol or alcohol is added to permit ready flow. The process of manufacture is hazardous throughout as all of the materials used are hazardous in themselves as in the finished product. Usually more stringent requirements than those imposed by Class I rules are observed in establishments manufacturing such lacquers.

**Artificial Silk Factories.** Several different processes are used for the manufacture of artificial silk, but all of them in general use involve hazards which warrant classing certain sections or buildings as Class I locations. In one well known process, the "viscose" process, wood pulp is treated with carbon disulphide in churns forming cellulose xanthate. As carbon disulphide is one of our most hazardous flammable volatiles, this part of the process is usually carried out in a separate building. The buildings containing this churn process, as well as any containing pump or other equipment for handling the carbon disulphide, are subject to the strict application of the rules for Class I locations. Acetate silk is produced by a

process, one part of which involves the solution of cellulose acetate in acetone, a flammable volatile. After filtering, it is ready to be formed into filaments. In this process the rooms or sections from the point where the acetone is introduced to the points where the filaments are formed, and including the pump houses containing the acetone handling pumps, should be regarded as Class I locations.

**Pyroxylin Plastic Factories.** The manufacture of pyroxylin plastic or "celluloid" as it is commonly known, is usually in the hands of large firms who are fully aware of the severe hazards entailed. Some parts of the process are so hazardous that rules more rigid than those prescribed by Article 32 are observed, in some cases even to the entire exclusion of all electrical apparatus and wiring from certain rooms and sections. The inspector will find, however, a wide variety of establishments manufacturing articles from pyroxylin plastic. The processes involve the handling and use of sheet or formed pyroxylin plastic and usually equipment for the utilization of scrap pyroxylin plastic is provided. The storage of the pyroxylin plastic in large quantities, together with the forming of articles and the storage of the finished product, renders the hazards of such factories of a serious nature. Coupled with this are the hazards connected with the storage, handling and use of solvents, and the reworking and storage of pyroxylin plastic scrap. The rules for Class I locations apply in full to factories of this type, except in those sections where the pyroxylin plastic or the articles made from it are not stored or used, which would exempt offices, power houses, locker rooms and similar locations. In factories where only a small part of the space is utilized by processes involving pyroxylin plastics, the hazardous area is generally taken to extend to a distance of 20 ft. from the particular process.

**Fabric and Paper Coating Plants.** In factories of this type are produced linoleum, oil cloth, artificial leather and similar materials. In some of these, notably those producing artificial leather, in reality a pyroxylin coated fabric, the processes are hazardous throughout and practically all parts of such plants, including the sections used for the storage and mixing of pyroxylin and solvents, the spreader room and the drying room should be considered as in Class I.



**Rubber Industry.** The chief hazard associated with the rubber industry is the churn process in which rubber is dissolved in a flammable solvent, usually gasoline, benzine or naphtha. Necessarily then, churn rooms as well as pump rooms and the rooms containing the solvent recovery process are to be considered as Class I locations. In the preparation of rubber coated fabrics, the cloth is coated with rubber dissolved in gasoline or other flammable solvent and applied by means of a spreader machine through which the cloth is fed. The cloth then passes over a drying table and then is hung in festoons in a dry room for vulcanizing and curing. The churn room, the spreader and dryer rooms, and any room used to contain pumps for the handling of flammable solvents are to be considered as Class I locations. Rubber gloves, rubber dolls and such articles are usually made by dipping forms of the desired shapes into a solution of rubber and a solvent, usually gasoline. The solution is contained in open dip tanks and hence, results in the liberation of quantities of flammable vapors. The room in which this process is conducted, as well as that in which the solution is prepared are to be regarded as Class I locations. The manufacture of automobile tires entails the use of large quantities of rubber cement, but if reasonable care is taken it is not necessary to designate the rooms where this cement is applied as Class I locations. However, the churn rooms where the cement is prepared are definitely Class I locations.

**Leather and Shoe Industry.** The hazards of this industry, from our viewpoint, are those associated with the use of pyroxylin lacquers for the production of lacquered leather, of the use of flammable varnishes for making patent leathers, the use of pyroxylin plastic for covering heels or forming box toes, and the use of pyroxylin lacquer for coating heels. These hazards are similar to some of those previously described under the respective subjects and the inspector should be governed by the comments applying.

**Hospitals.** The operating rooms, due to the presence of flammable anaesthetics and the X-Ray film storage vaults are to be considered as Class I locations. When only acetate film is stored, the film storage vault need not be considered as Class I location, but it is usually found that at least some nitrate film is stored.

**Soap Factories.** In some types of soap naphtha is added and, therefore, the manufacture of such soaps entails the storage and pumping of naphtha. This requires the application of the Class I rules to naphtha pump houses or rooms as well as to the rooms where the naphtha is added to the soap. In toilet soap of the transparent variety, alcohol is used for the purpose of dissolving the soap and permitting the impurities to settle, whereupon the alcohol is distilled off. The rooms where these processes are carried on should be regarded as Class I locations. In the manufacture of liquid soap a hard soap is dissolved in warm alcohol. Where operations are extensive the flammable vapors of alcohol will be present where the process is carried out and, therefore, the

rooms or sections involved should be regarded as Class I locations.

**Miscellaneous.** Various other industries or processes should be scrutinized for hazardous conditions. These may include "Rotogravure print shops which employ an ink usually consisting of one part of ink to three parts of naphtha; metal working plants which sometimes employ a flammable solvent for removing cutting oil and grease previous to heat treatment of metal parts; oil clothing factories where the garment is painted with a naphtha thinned varnish; hat manufacturing where hats are sprayed or dipped in pyroxylin lacquer.

Next month the requirements for apparatus and wiring to meet Class I conditions will be discussed in detail.

## The Larger Opportunity of the Inspector<sup>\*</sup>

By S. B. Williams

Editor and General Manager  
ELECTRICAL CONTRACTING

FOR some reason or other, the electrical industry has been rather successful on the whole in the type of man that it has attracted to electrical inspection work. Since it cannot have been the salary that brought these men into this work and kept them there, what was it?

We like to think that the primary motive is the opportunity that the job holds for a man to do something fine and worthwhile—and the opportunity is there if we look not to the letter of the law, but the spirit thereof.

By the letter of the law an inspector is a policeman engaged in the negative job of stopping someone for doing something not in accordance with the municipal regulations. Surely there can be no pride in that kind of a job.

By the spirit of the law the electrical inspector is charged with the public safety insofar as it is affected by electrical hazards. That is a positive—constructive job—one of tre-

mendous opportunities—one in which any red-blooded man can be proud and enthusiastic.

Naturally one element of this broader job is the detection and prevention of illegal wiring. A bigger part, however, is the creation of a condition wherein violations would seldom or never occur.

In many cities in the past two or three years the electrical inspection department has been very seriously cut down or abandoned simply because the work was judged by the income of the department from fees. In those cities the electrical inspectors had not been fully awake to the real opportunities of their job.

In many cities the inspectors have wanted reinspection but have been unable to make any headway with the city fathers. In many cities inspectors have lost heart when the courts have been unwilling to punish bootleggers of wiring.

I know of some cities where the inspector and the contractors have worked together many months in the drafting of a new city code and ordinance designed to bring the code up-

<sup>\*</sup>Presented at 1st Annual Convention A.I.E.I., Chicago, Ill., Sept. 15, 1933.

to-date and honestly to promote the public safety, but only to have it badly butchered before finally being accepted by the city council. During the struggle for its passage both contractors and inspector have been the target for abuse which sometimes has cost the inspector his job.

Sad as these experiences are, there is hope. I find that these inspectors who have been stymied in their work are still looking for a solution. It is available.

In the first place, the electrical inspector and his work are not known by the average man on the street. Oh, of course, there are exceptions but by and large the public does not know much, if anything, about his work or about the city ordinance governing wiring.

#### Let the Public Know

There is the place to start in creating the greater opportunities of your office. Let the public know about your work and the law. It is not necessary to frighten the public but it is essential to create the public belief that only inspected wiring is safe.

What did your city pass a code for if it was not to protect the public? Then let the public know how its interests are being looked after and what it must do to cooperate with your department to insure the maximum public safety.

How can you do this? In numberless ways.

In the first place, you are a public official and therefore news. Cultivate the newspaper reporters who cover the city hall. There is generally some time in the week when news is short and the reporters need help. If you have something good for them they will give you the play.

Make an effort to talk before women's clubs, men's lunch clubs such as the Rotarians, parent-teachers' associations, and any other place where your public holds meetings. They frequently are at a terrible loss for a speaker—be ready.

Your local radio frequently has unoccupied time that it would be glad to fill with an address by a public official.

By means of such publicity the public mind can be influenced and your work made easier.

For instance, if a new code is projected start well in advance to sell the major ideas to the public. Then

when you are ready to present a draft of it to the council, the public instead of cursing it as something designed solely to increase costs will praise it as something designed to improve the public safety.

If the courts are too lenient with bootleggers a patient course of publicity will soon have the public criticizing the courts for such laxity.

If the council is unwilling to approve of reinspection let the public demand it after a period of well designed publicity.

But that is not all. If you are to accomplish the greatest good in your community you must exert yourself to the utmost to work with the local electrical industry.

It is just as essential that you sell your work to the contractors, manufacturers, wholesalers and utilities as it is to sell it to the public. Without their active support the progress of your work is bound to be slow.

If there is no local association of contractors create one, without dues. Inspire them with the value of the work you are doing. Hold meetings where you will discuss different parts of the code and invite questions which you will answer. If you have a difference of opinion on a code question with a contractor, discuss it with the group. It will show your fairness.

Impress upon the contractors the necessity for working with you if bootlegging is to be stamped out. Show them how to let you know about work for which no permit has been issued.

In this way you can create a better grade of workmanship and can feel better about encouraging the public to hire only licensed contractors.

In fact I would urge this association to go further and try to arrange for joint committee action with the N. E. C. A. so that national impetus and direction may be given to these local associations.

#### Promotes N. R. A.

And finally, your work offers the opportunity of promoting the President's N. R. A. program.

Basically this program is one of creating employment. The electrical inspector is a most important factor in this connection.

In the first place, is bootlegging, that is wiring without inspection. It takes work away from competent

men, it encourages bootleggers to reduce the quality of the job and, therefore, the labor therein, and it reduces the fees of your department thereby reducing proportionately your opportunity to work.

If you can by publicity and by working with the contractors, reduce bootlegging you can increase employment in your city.

The opportunity for greater employment through reinspection is, of course, obvious. Figures gathered by our editors three years ago showed over 900 millions of wiring in such a dangerous condition as to need replacement.

In only a few cities is it possible to enforce reinspection regulations but in every city it is possible for the electrical inspector to sell reinspection to the public.

#### Sell Reinspection

There is not enough new building in any city to keep the inspection department busy. The free time can be used in making reinspection of factories, office buildings, theatres, etc., and then taking the facts to the owner. Most owners will be reasonable and will cooperate with you. Don't try to force them but show them wherein it is to their advantage to correct the defects. It isn't necessary that all the defects be corrected at once. Tell the owner he should correct the more dangerous ones now and the others a little later on. He will see your logic and when he thinks you are a regular fellow and quite reasonable he will be inclined to meet you more than half-way.

Incidentally, you may find that this work will help the fees of your department sufficiently so that another man may be added.

The record of electrical fires shows clearly the large loss that is suffered each year from uninspected wiring. Fire creates unemployment.

Today is the day of hope. Only improvement is ahead. As individuals we can now make plans with the feeling that they will work. Yours is a big job if you will have vision and initiative. Look not to the letter of the law but the spirit thereof.

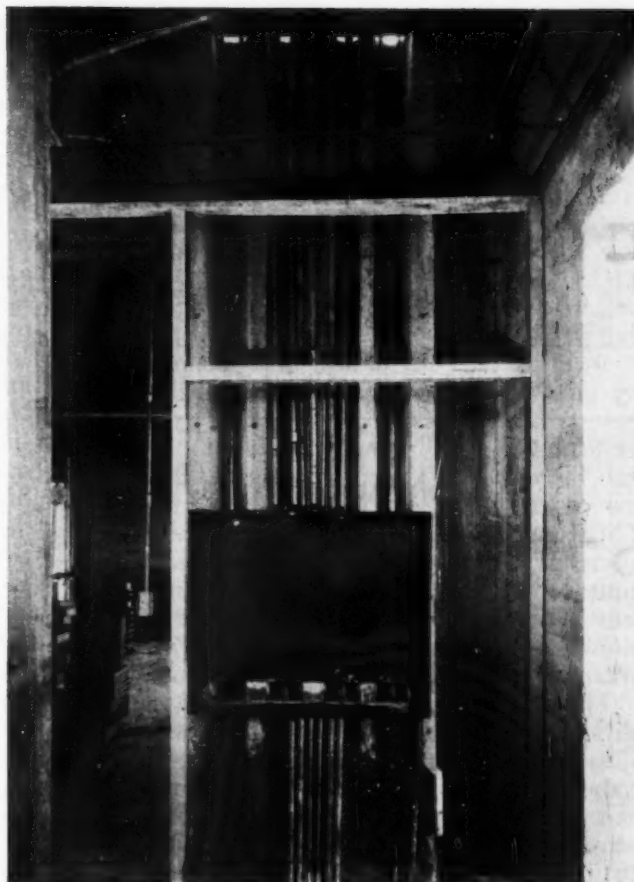
Educate the public to demand electrical safety. Create a big place for your work. Work with the electrical industry that it may work with you. Promote reinspection and fight bootlegging as your contribution to National Recovery.

*Electrical Contracting, November, 1933*

Each of the three 2-in. and the one 1-in. (neutral at left) tubes is suspended from the 14th floor by a  $\frac{3}{4}$ -in. "U" clevis and insulated from the 8-in. supporting "I" beam by a heavy porcelain strain insulator. These risers, which are 120 ft. long with a 2,000,000 c.m. cross-section, are carried in a concrete riser shaft with 2-in. concrete barriers between risers. They are insulated with micarta tubes when passing through floors. There is a 2-in. air space around all conductors. In addition to these features the photograph shows the 14th floor panel in place with branch circuit conduit runs. Taps to tubular bus risers are made at aperture at lower back of cabinet. The front of the shaft was later walled in by a steel plate.

## Tubular Bus Wiring

In the new all-electric Sunset Towers Apartment, Hollywood, Calif., a tubular bus riser system was installed by the Bennett-Taylor Electric Co., which showed some simplification in the method of installing such risers. Service is 3-phase 4-wire 120/208 volts.



Method of connecting 12 ft. sections of the copper tubing can be seen here. Each end of the two pipes is forced over a shouldered copper plug, shrunk, tinned, and pinned. The resulting joint is practically of original pipe strength.





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# electrical contracting

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*With which is consolidated Electrical Record*

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S. B. WILLIAMS, Editor

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## THE CONTRACTORS' CODE

STILL no NRA Code—but the password is patience. Not only is the electrical contractor's code faced with its own problem but it has had to wait until the confusion in the construction industry was first straightened out.

The policy with respect to labor has probably presented more of a problem in the construction industry code than any other. Labor is eyeing the public work's program and attempting to introduce minimum wages that are very close to maximums.

Then there is the problem of who shall be included under the electrical contractor's code. Shall it apply to service shops, to electrical departments of industrial plants, to wholesalers and manufacturers doing installation and erection work?

After the September 6 hearing it was felt that a code would be ready before the end of that month. Instead another hearing took place on October 26 and it may still be some time before a final decision is reached.

Nevertheless, local associations should not be discouraged. Their tie-in with the National has been necessary even to accomplish so much. Had there been no national association to adequately represent the electrical contractors their code would have been a sorry thing for the industry.

The effort on the part of outside organizations to set up provisions inimicable to the best interests of the electrical contracting industry have required the greatest vigilance on the part of N.E.C.A. It should be gratifying to the members of the association to know that their code committee is so alert and so willing to give up the time to travel to Washington and elsewhere and otherwise do the job entrusted to them.

It takes money to do this work of pre-

paring a code and sending committees to Washington. It is going to take more money to police the code. Unless the contractors give their financial support to the N. E. C. A. by a considerably larger membership, it will not be possible to secure the greatest good from this code.

The I. B. E. W. has already challenged the right of the contractors' own national association to speak for the contractors and have intimated that the I. B. E. W. is the more logical spokesman. If the code is not adequately enforced because of numerical and financial weakness on the part of the National Electrical Contractors' Association, it is quite possible that what was intimated might become a demand on the part of organized labor.

Is this what the electrical contractors of this country want? If not, there is but one answer. Let them join the N. E. C. A. in sufficiently large numbers to enable the national code authority once the code is signed to make it effective by the right kind of enforcement.

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## THE NEW CODE

THE new 1933 National Electrical Code which is now available contains the words "Effective, November 1, 1933."

In those cities operating under the Uniform Ordinance clauses the new Code is now in effect and it is advisable that all who do not have copies secure one at once.

An analysis of the changes in this edition is available from the National Electrical Manufacturers' Association.

ELECTRICAL CONTRACTING will be glad to help any contractor who has not been able to secure copies of these books to do so.

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## TAXES

WITHIN the past two years the taxes levied on electric light and power companies have, in a great many instances, gone beyond the bounds of reason, and while the members of the other branches of the electrical industry might feel it did not affect them, they should begin to open their eyes.

These taxes have to be passed on to the public in some fashion. They may be added to the bill or paid by the utility in lieu of lower rates. The public nevertheless pays.

By asking the public to pay directly or indirectly a higher tax on electricity than



it pays on almost everything else is to place an unfair handicap in the way of the development of electric service. When electricity is taxed more than other commodities the business of the entire electrical industry suffers.

#### THE EIGHTY PER CENT

"THE contractor is not a salesman. He is interested only in price and will use the cheapest thing he can buy that will get by."

This, in general, is the attitude taken by many manufacturers, utilities and wholesalers when discussing the electrical contractor. Is this a true picture of the contracting industry, and if not, whose fault is it that such a picture has been permitted to grow up?

ELECTRICAL CONTRACTING has contended that this branch of the industry is essentially a selling branch, at least so far as 80 per cent of the work is concerned. In proof of this contention, numerous articles have been printed within its pages showing how this selling was accomplished. Nevertheless, the derogatory opinion of the industry continues.

For years half or more of the contractors were in the group doing exceptionally small work and having a volume of business less than \$10,000 a year each. The aggregate volume of business for this group for the United States was never more than 20 per cent of all of the work done by electrical contractors. Nevertheless, this group being more numerous than the others, and being in business but a short period of time, and having less experience, committed more errors.

It is the errors of this group that have been visited upon the entire industry.

Within the group doing 80 percent of all the work there are thousands of electrical contractors who have built up sound healthy businesses which could have grown only by force of good salesmanship. Of these contractors we hear very little. Apparently it is the mistake that gets notice and because of the number of mistakes emanating from the group of small men, the whole industry gets a black eye.

We know of no other industry where the poorest group gets the most publicity. If we think of drygoods stores, we think not of the thousands of one-man, poorly financed and poorly operated stores, but of the few big stores. The same is true of any other industry except that of electrical contract-

ing. It is the failures in electrical contracting that seem to characterize the industry rather than the successes.

There should be some way to overcome this and it must be done if the electrical contractors are ever to take their rightful part in the councils of the electrical industry, or if the electrical contractors are ever to get a fair break in the policies of the electrical industry. So long as the rest of the industry views the electrical contractors with a sorely critical eye, just so long will the contracting branch of the industry be blamed for the industry's failures and get the poor end of the bargain every time.

Only recently a man who should have known better criticized the electrical contractors because more electrical energy was not being sold. It was not the central station that was criticized for not selling more energy, or the manufacturer and wholesaler for not selling more material and appliances; it was the contractor. In other words, all the ills of the industry were visited upon him. This must be changed, not only for the good of the contracting branch of the industry, but for the industry as a whole. So long as the rest of the industry feels that there is some other branch to blame for anything and everything, just so long will the rest of the industry be content to spend its time in censuring instead of doing its own work.

It is true that there are many things that the contractor has been blamed for not selling which he cannot sell at present prices and present margins. He has selling costs the same as anybody else, and fortunately has not been willing to let the rest of the industry burden him with costs that he cannot bear. It is equally true that he has had very little constructive selling help or market development help from the rest of the industry. It is further true that he has had very little constructive and intelligent sales guidance from the rest of the industry which has prided itself upon its own ability to sell. Nevertheless, the electrical contracting industry has built up a tremendous volume of sales and some way must be found to place the contractors before the industry in their true light.

ELECTRICAL CONTRACTING will continue in its efforts to make this apparent to the rest of the industry, but it cannot do the job alone. This is something that the electrical contractors themselves must study and develop and promote. It is a job for their own local as well as national associations.

# \\ code chats ///

A MONTHLY DISCUSSION OF WIRING PRACTICE AND QUESTIONS OF INTERPRETATION, PRESENTED WITH A VIEW TOWARD ENCOURAGING A BETTER UNDERSTANDING OF THE NATIONAL ELECTRICAL CODE

CONDUCTED BY F. N. M. SQUIRES

ASSISTANT CHIEF INSPECTOR, N. Y. BOARD OF FIRE UNDERWRITERS

## DEAD FRONT SWITCHBOARD

*It has been suggested that we install on a theatre stage a switchboard which will be enclosed in a cabinet having in its cover a small door which, when open, will expose only the handles of switches controlling various circuits. Is such an arrangement considered a dead-front board?*

The object in requiring a dead front switchboard for stage use is to remove the possibility of accidental contact with live parts by persons on the stage. Many scenic displays are produced with metallic props, costumes, etc. which might become dangerous if brought in contact with live switches.

As the enclosed switchboard described in the question above prevents such contacts it would be acceptable as meeting the requirement for a dead front board.

## RANGE INSTALLATION IN NICHE

*A prospective customer desires to install electric ranges in niches similar to those used for refrigerators, that is, the entire range, except the front, to be surrounded by the room walls. The height above the range is to be the same height as the ceiling.*

*Using common plaster walls on wood lath, how close is it permitted that the walls be run to the range? Would there be any difference using metal lath or using tiled walls surrounding the range? Would any difference be made if an electric exhaust fan were placed on the rear wall?*

Underwriters' Laboratories advise that they normally test a range with a space of six inches between it and a

surrounding wall unless requested by the manufacturer to test with less space. The range to be approved must then not raise the temperature of the wall above safe limits. Therefore, a 6-in. space should be left between a range and the wall.

A metal or tile wall will, of course, stand higher temperatures than a wooden one and, therefore, the space could be decreased.

## BARE RISERS

*515-a. Where are bare conductors serving as main risers or feeders in fire proof construction used and the advantage over insulated wires?*

Bare conductors are being used in some new building where a "chase, channel or shaft" is provided during the construction of the building. The advantage is in the saving of metal—generally copper—which is used as the conductor. This conductor, being bare, radiates heat more readily than a covered one and, having no insulation to become deteriorated, can be subject to greater temperatures.

## ALL WIRES TO BE WITHIN SAME ARMOR

*What does 506-g mean?*

This is the 506 style of stating the requirement that when alternating current is used all wires of a circuit are to be within the same armor. This ruling corresponds to 503-o for conduit, 504-g for surface metal raceways, 505-m for armored cable, 508-o for electrical metallic tubing, 511-i for raceways and busways, and 512-o for auxiliary gutters.

## UNDERFLOOR RACEWAYS

*506-b. What is meant by: "Open-bottom types of underfloor raceways shall not be used in floors of monolithic construction". Why is this not allowed?*

In monolithic construction the entire thickness of floor slab—from ceiling of floor below to flooring of floor above—is cast in one pouring of concrete. It would, therefore, be impossible to place an open bottom underfloor duct in position and not have it fill up with concrete in the pouring operation.

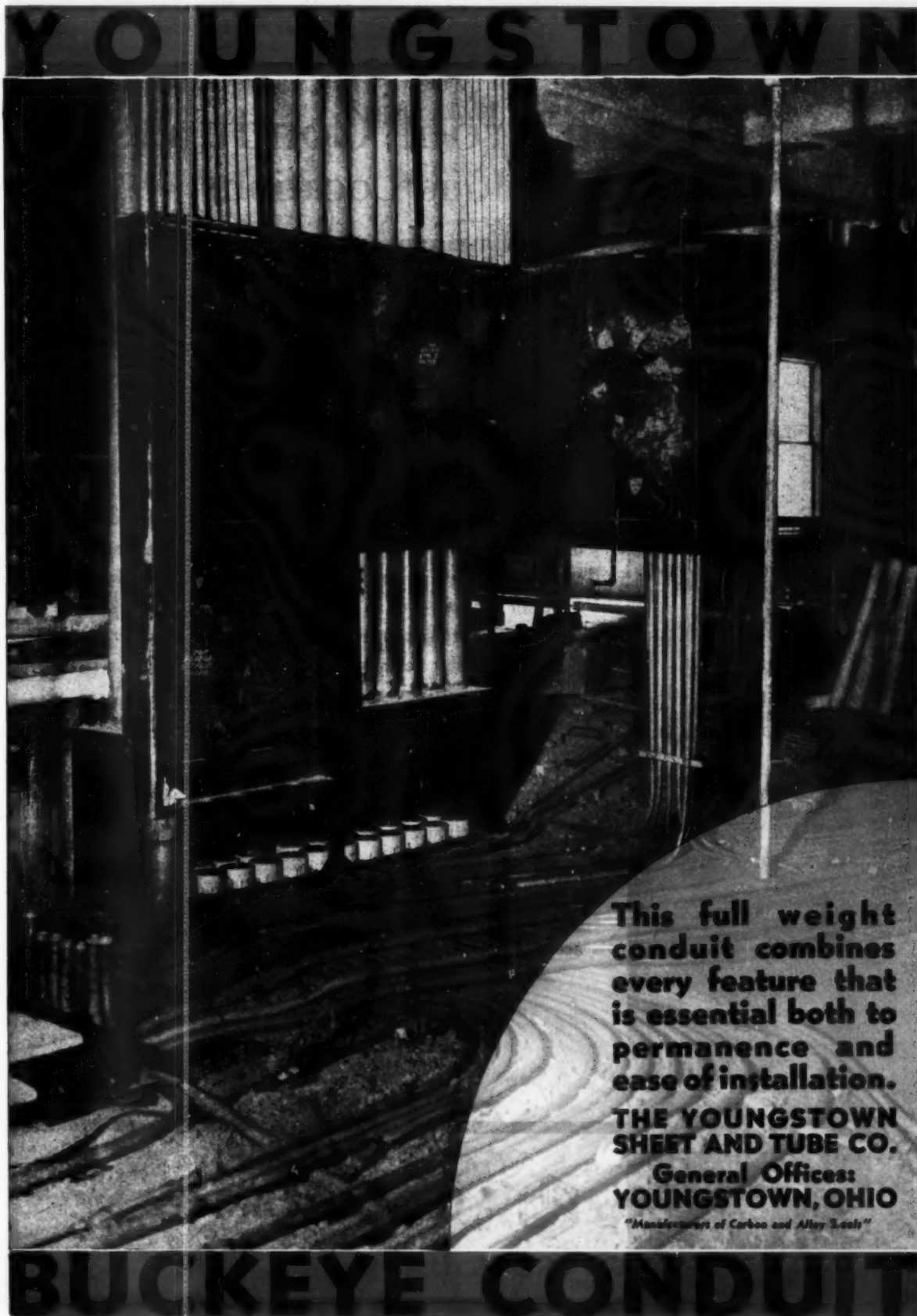
*506-d. Why is it necessary to keep the raceway in such a straight line? Does it also mean that no elbows are allowed between junction boxes?*

One of the purposes of underfloor duct is to provide, at the time of building the structure, a network of hollow ducts beneath the surface of the floor by the use of which floor outlets may be installed after the completion of the building. In order to be able to tap into the duct it is necessary to align the duct and to have markers to locate the center line. These markers are the junction box covers and/or the markers mentioned in 506-f. Elbows are not permitted except by special permission which is really what the first sentence of 506-f means.

*506-e. What is meant by raceways and fittings shall be so arranged that there shall be no low points, or traps in the raceway run? What harm would it do?*

This provision is to prevent the accumulation of water or other liquids at any low point or trap. Water lying in such a place would

*Electrical Contracting, November, 1933*



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Explosion-Proof Lighting Fixture Condulets are carefully designed to comply with the exacting requirements of the Underwriters' Laboratories for use in Hazardous Locations. They are intended for use in places where, with ordinary lighting fixtures, a broken lamp or a ground or short circuit in the receptacle or wires might cause an explosion.

Openings between lamp and wiring compartments, around or through the lamp receptacle, are completely sealed. Wire terminals are covered by the sealing compound to a depth of at least  $\frac{5}{8}$  of an inch, but pigtail leads provide for connection to the circuit wires. An explosion in either compartment cannot be communicated to the other.

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have a deleterious effect on the insulation of wires and would soon rust the armor of armored cable if run in the raceway.

*What type of raceway is used most, fiber or metal? Which is the best?*

This is, of course, an open question and one which cannot be answered in this column. There are arguments in favor of each. The manufacturer of each type will probably be glad to supply information as to the merits of his material and also the amount in use.

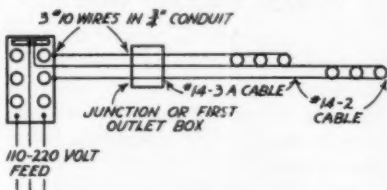
506-m. What is meant by "pads" as: "Where it is impossible to install the required pads for crossing conduits or structural steel, only armored cable, etc., shall be used."

The pads mentioned in 506-m are the "smooth pad of 1-in. concrete" required by rule 506-c for the open bottom type of underfloor raceways.

### THREE-WIRE CIRCUIT

Is it permissible to save copper by making two circuits out of a 3-wire 220 volt circuit and especially if the runs are long between the first outlet from the panel, also from outlet to outlet.

Below is a sketch of the proposed set up. Panel is 6-circuit, single fuse, 3-wire main, solid neutral, with neutral grid. Using three cables 14-3 to outlets and conduit from panel to first outlet using three sets of wires size No. 10. In the sketch but one conduit is used for two circuits.



The Code recognizes a three-wire circuit such as is illustrated above; but calls it a multi-wire circuit. Such a circuit may be derived from a 110-220 volts, three-wire D.C. or a single phase A.C. system or from a four-wire three-phase A.C. system. It should not be derived from a two-wire feeder unless particular care is taken to make sure that the neutral is of sufficient size. In a layout such as described above all wires must be within the same armor but two-wire



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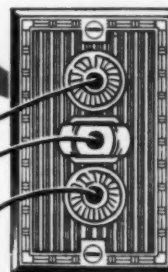
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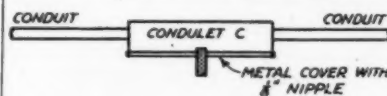
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extensions are permissible from any outlet.

Each side of the three-wire circuit may be loaded up to the limits given for a two-wire branch circuit. In fact, a three-wire circuit is but a combination of two two-wire circuits each using the same common neutral.

## BOX COVER AS FIXTURE SUPPORT



*Does 703-c mean that it would not be permissible to fasten a fixture on the above fitting? If not, why?*

The cover of the type C conduit as shown in the above sketch is not a fitting such as mentioned in rule 703-d. This cover may be regarded as a fixture canopy and it certainly makes a tight metal to metal fit with the box. Generally in this class of work the "fixture" part of the assembly consists only of a nipple or short stem and a socket. There seems to be no logical grounds for not approving such an arrangement.

## GROUNDING AUTO-TRANSFORMER CASES

*Is it necessary to ground the cases of auto transformers? If so where does it state this in the Code?*

Rules 905-a-4 and 1005-e indicate that auto transformer cases are to be grounded.

## BARE GROUND WIRE

*907-f says that the ground wire can be bare if connected to a water pipe electrode. Why must a pipe electrode be used when the wire is bare and why is an electrode considered better than a clamp?*

The Code in 907-f does not rule against the use of a clamp. It provides that a bare wire used as a grounding conductor is permitted only where the grounding is accomplished by means of a water piping system.

Our correspondent is evidently confused by the use of the word "electrode." The meaning of the rule may be a little clearer if you leave out the word "electrode" and read this part of the rule "\*\*\* such insulation may be omitted if the grounding conductor is connected to a water pipe."

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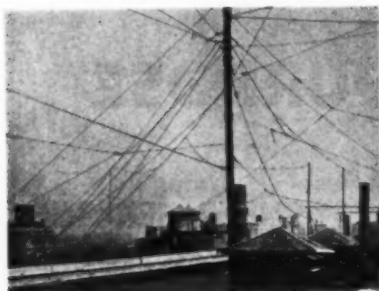
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# N.E.C.A.

## NEWS AND SERVICE INFORMATION

MATERIAL FOR THIS DEPARTMENT IS SUPPLIED BY THE HEADQUARTERS STAFF OF THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION  
420 LEXINGTON AVENUE, NEW YORK, N. Y.

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14 North Franklin Street, Chicago, Illinois

Vice President, Earl N. Peak  
1603 West Main Street, Marshalltown, Iowa

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Contractors Organized for Industry Welfare

**NEW N.E.C.A. CHAPTERS**

Electrical Contractors Association of Maryland covering the jurisdiction over the State of Maryland, to be known as the Maryland Chapter. H. S. Parsons, 13 North Carey Street, President. J. Roland Stolzenbach, 418 East Pratt Street, Secretary.

Electrical Contractors Association of Passaic County, N. J., covering the jurisdiction over Passaic and Bergen Counties, also Boonton, Dover, Rockaway in Morris County and towns contiguous thereto which use above trading centers, to be known as the Northern New Jersey Chapter. Charles D. White, 23 Park Avenue, Paterson, N. J., President. H. W. Desaix, 107 19th Ave., Paterson, N. J., Chairman of Executive Committee.

Electrical Contractors of Spokane covering the jurisdiction of Spokane and vicinity to be known as the Spokane, Wash., Chapter. Dwight P. Henderson, 118 North Lincoln St., Spokane, Wash., President. Warren Oliver, N. 114 Lincoln St., Spokane, Wash., Secretary.

Kenosha, Wis., electrical contractors, covering the jurisdiction over

Kenosha County, to be known as the Kenosha Chapter. Joseph P. Josephson, 6104 22nd Ave., Kenosha, President. F. J. Forbes, 724 58th St., Kenosha, Secretary.

**NEW MEMBERS**

The following applicants have been accepted into the N.E.C.A. since the publication of the list in the October issue:

**CALIFORNIA**

**Auburn:**  
Adams Elec. Shop

**Brea:**  
Oil Fields Elec. Co.

**Burbank:**  
Stolper Elec. Co., Ltd.

**Compton:**  
Nygaard Elec. Co.

**Chula Vista:**  
Kinmore Elec. Co.

**Glendale:**  
W. L. Hyde Co., Inc.  
Magee Elec. Co.  
Smith Electric Shop

**Hayward:**  
Frank Sherman Electric

**Hollywood:**  
Barker-Allen  
Doran's Elec. Shop  
Otto K. Olesen Illuminating Co., Ltd.

(Continued on page 28)



602-d. Single conductor Type R wires, unless provided with a lead sheath, shall be covered for their entire length with a braid which is both flame-retarding and moisture-resisting.

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NEW CLAUSE *in*  
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*insist upon . . .***

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1,635,829  
1,772,436  
1,765,000



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1,410,790  
1,536,549

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### Los Angeles:

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L. A. Duncan  
English Electric Co.  
S. H. Fish Elec. Co.  
R. M. Fry Elec. Co.  
Golden State Elec. Co., Inc.  
H & H Elec. Co.  
Hamm & Smith  
W. C. Hill Electric  
Hill Electric Co.  
Howard's Elec. Shop  
Chas. H. Johnson  
Johnson & Norberg  
Joseph Korb  
Littlejohn Reuland Corp.  
Moore Elec. Co.  
Newbery Electric Corp.  
C. J. Nutsch Elec. Co.  
Nicholas Electric Co.  
H. H. Obermiller  
H. W. Parsons  
L. E. Poulsen  
Quality Elec. Co.  
C & S Electric Co.  
L. M. Steele  
Walter West Electric Co.

### Lynwood:

Lynwood Elec. Co.

### Newport Beach:

Home Electric

### Oceanside:

Berg Electric Co.

### Pasadena:

Acme Electric Co.  
Rhend Elec'l Constr. Co.  
Folts Electric Service  
J. B. Morgan

### Pomona:

Valley Elec. Co.

### Redlands:

Redlands Elec. Co.

### San Diego:

Peacon Electric  
California Electric Works  
Capitol Elec. Co.  
City Electric Co.  
Gill Elec'l Co.  
San Diego Elec. Shop  
J. F. Zweiner Elec. Co.

### San Francisco:

Adams Elec. Co.  
Arc Elec. Co.  
Bay View Elec. Co.  
Century Elec. Const. Co.  
Crescent Elec. Shop  
Draeger Colombo Elec. Co.  
E. Z. Electric  
Eureka Elec. Co.  
Grandi Elec. Co.  
Ewald A. Koenig  
C. V. Johnson  
MacCabe Elec. Co.  
Martinez Elec. Co.  
L. Roy Moser  
Richmond Elec. Co.

### San Jose:

Garden City Elec'l Co.  
Guilbert Bros. Elec. Co.

### Santa Ana:

Gilbert Weston Stearns, Inc.  
MacFarlane Electric

### Santa Monica:

Bay Cities Elec. Co.  
Globe Elec. Co.  
P & M Elec. Co.

### South Pasadena:

R. R. Jones Elec. Co.

### Van Nuys:

Vanderlip's Elec. Store

### CONNECTICUT

### Bridgeport:

Richard C. Keeton

### Hartford:

D. A. Battistim Co.  
Clarence A. Metzger

### West Hartford:

George H. Swift

### FLORIDA

### Miami:

Hardy Elec. Co.  
Allapattah Elec. Co.

### Miami Beach:

F. C. Ast Elec. Co.  
Miami Beach Elec. Co.  
L. H. Wessels

### Ocala:

L. G. Bailey

### West Palm Beach:

Seminole Electric Co.

### MARYLAND

### Baltimore:

Wm. H. C. Beaty  
Clarence C. Bichell  
Bocek Bros.  
Broadway Elec'l Co.  
Central Electric Co.  
The Gay Electric Co.  
Harry A. Goldberg & Co.  
Morris & Ward  
Statter Electric Co.  
H. E. Valdivia

### MASSACHUSETTS

### Boston:

Macfarlane & Abbott, Inc.

### MICHIGAN

### Detroit:

F. J. O'Toole Co.

### NEW JERSEY

### Belleville:

Christian P. Hansen

### Clifton:

Cole Electric Co.  
Wittie Electric Co.

### Haledon:

Haledon Service Elec. Co.

### Little Falls:

John E. Cocker  
John Potts

### Passaic:

I. M. Grossman & Co.  
Independent Elec'l Constr. Co.

### Paterson:

Bennett & Story  
Berns Electric Co.  
The Cohen Electric Co.  
J. R. DeMott, Inc.  
S. Dorner  
P. Dunkelman  
Hy-Grade Elec. Co.  
Industrial Elec'l Const. Co.

Murdock & Miller

Pargman Elec. Co.

John Reid

Silk City Lighting Co., Inc.

### Pequannock:

Tri County Elec'l Co.

### Preakness:

Frank A. Gill

### Rutherford:

Homer W. Hasbrouck

### NEW YORK

### Brooklyn:

John H. Behnken  
Bourke Elec'l Service  
Benj. Buxbaum  
Albert S. Campbell  
G. A. Collier, Inc.  
Dropkin Bros., Inc.  
Flatbush Elec. Maintenance Co.  
F. O. Forker Sons  
John A. Grenzig & Son  
J. Hoffman & Co. Inc.  
J. S. Electric Co., Inc.  
Jarasnow & Snyder  
Kennedy Bros. Elec. Co.  
Kings Highway Elec Co., Inc.

Klein Bros.

C. W. Kline

William H. Lohman

Wm. H. Ludwig

Meinch Bros., Inc.

Charles Michaels

Monitor Electric Constr. Co., Inc.

P. J. O'Rourke Elec. Eng. Co., Inc.

E. Pessin

P. & S. Electric Co.

Prussack Elec. Co.

City Installation Co., Inc.

S. Savedoff Elec'l Corp.

H. H. Schwartz, Inc.

L. C. Seider

William Stern

Summers Elec. Co.

Wm. J. Sutterer

L. Traiger Elec. Co.

Trojan Elec. & Machine Co., Inc.

William Tumarkin

Harry Tyroler

The Universal Elec'l Contrg. Co.

Samuel Weiner

Henry Wolfgang

### Gloversville:

P. E. Conover

Earle Mesick

Mason's Elec. Shop

B. E. Shell Co.

### Johnstown:

Frank Foster

H. W. Jansen

### Shenectady:

Fred B. Rickert

### OHIO

### Canton:

F. R. Hannon Elec. Co.

Ralph Kohn

Richard McGiffin

Saunders Elec. Co., Inc.

Spring Bros. Elec. Co.

Walters Elec. Co.

N. W. Wirth

### Lima:

The Barnes-Joy Engineering Co.

Carl Evans Elec.

Reed Bros. Elec. Co.

Sauers Electric Co.

Sweeney Graham Corp.

### Springfield:

C. C. Meals

### Toledo:

The Romanoff Elec. Co.

### OREGON

### Portland:

Broadway Electric Co.  
Hackett Electric Co.  
Hawthorne Elec. Co.  
A. J. Huenergard Co.  
Montgomery Electric Co.  
Smith Electric  
Terminal Elec. Co.

### PENNSYLVANIA

### Philadelphia:

American Elec'l & Maintenance Co. of Phila.  
H. R. Crabtree Elec'l Works  
William G. Hinderer & Bro.  
A. J. La Course  
A. O. Thomas & Co.  
Watts & Stern, Inc.

### TEXAS

### Houston:

Aldis Electric Co.  
Balcke Electric Co.  
Carr Electric Co.  
Central Electric Supply Co.  
Dissen Electric Works  
Electric Motor Repair  
Jack J. Hill Elec. Co.  
Jacobe Bros. Elec. Co.  
F. W. Kolle Elec. Co.  
I. W. Lippett Electric Co.  
Fred Mahaffey Elec. Co.  
L. E. Miller Electric Co.  
Payne Electric Works  
Read Elec. Co.  
E. R. Rothrock Radio & Elec. Co.  
R. C. Standish Elec. Co.  
Still Elec. Co.  
University Elec. Co.  
Waterfield Elec. Co.  
White Oak Elec. Co.  
J. A. Wolfram Elec. Co.  
Woods Elec. Co.

### UTAH

### Salt Lake City:

Vance Elec. Serv. Co.

### VIRGINIA

### Richmond:

W. A. Christian

### WASHINGTON

### Spokane:

Chamberlin Electric Co.  
Wm. Stack Electric Co.

### WEST VIRGINIA

### Charleston:

C. A. Henson  
Ostrin Electric Co.  
S. A. Waldo

### WISCONSIN

### Fond du Lac:

B. Krautsch Elec. Shop  
Krueger Elec. Co.  
E. H. Tursky Co.

### Fort Atkinson:

C. D. Mattoon

### Green Bay:

Gerhard Electric Co.

### Janesville:

Allan-Westphal Elec. & Machine Co.  
Ellsworth P. Parish  
Wisconsin Elec. Sales Co.

### Watertown:

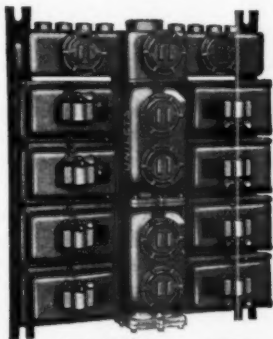
Riverside Elec. Service  
Arthur Ruesch



Type "GRU-1" Unilet with  
1/2" Union Hubs

Meet the Hazards  
Involved... with—

# APPLETON Explosion-Proof Fittings!



Type "FLP"  
Explosion-Proof  
Panel Board

As more information is known on the requirements for wiring of hazardous locations, manufacturers and companies of all kinds realize the utmost importance of using Appleton Explosion-Proof Fittings. Lower insurance rates and the minimizing of possible dangers to life and property, are two of the important reasons.

Appleton Explosion-Proof Fittings meet the explosion-proof requirements of the Underwriters Laboratories—they are made of malleable iron, insuring strength without bulk, and their Cadmium Finish is rust resisting. They are the safeguard you need in all hazardous locations.

Write for Bulletin 1002 for complete information.

APPLETON ELECTRIC COMPANY

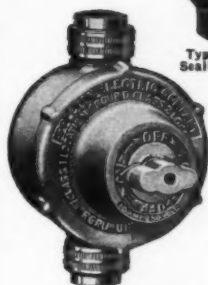
1749 Wellington Ave., Chicago, U. S. A.

New York—150 Varick St. Los Angeles—340 Azusa St.  
San Francisco—655 Minna St.

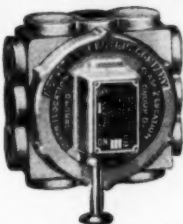
## APPLETON Explosion-Proof UNILETS

Reg. U. S. Pat. Off.

STANDARD FOR BETTER WIRING

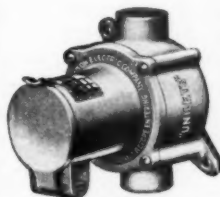


Type "ESUF"  
Sealing Unilet

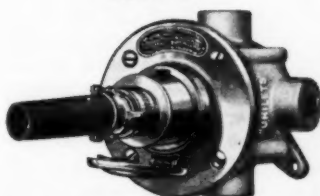


SW-5-A Series Explosion-  
Proof Fitting with  
Toggle Switch

SW-1 Explosion-Proof  
Fitting with  
Snap Switch



Type "CPSIC"  
Unilet Complete with  
Lift Cover (Closed)



Type "CPSH"  
Unilet complete with Lift  
Cover and showing Type  
"CPS" Plug inserted  
in Receptacle



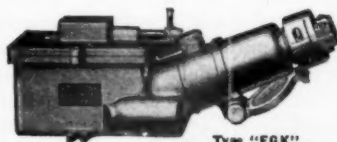
Type "GRU-2"  
Unilet



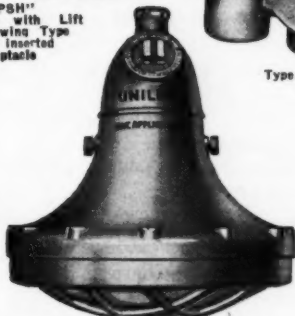
Explosion-Proof  
Flexible  
Coupling



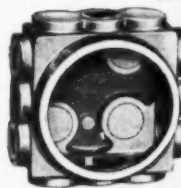
Explosion-  
Proof Union  
Connector



Type "EGK"  
Unilet with Interlocking  
Type Safety Switch, Plug  
Receptacle and Type  
"EGK" Plug Installed



Type "EVA"  
Explosion-Proof  
Lighting Fixture



Type "GRU-2"  
Unilet with Cover Removed  
Showing Close-up Plugs  
in certain Threaded  
Openings



Type "CES"  
Explosion-Proof Re-  
ceptacle Equipment  
Complete with Type  
"CPS" Plug



# KILLARK

EXPLOSION  
RESISTING  
and other

## CONDUIT FITTINGS

# CONTRACTING

# news

INFORMATION OF INTEREST TO ELECTRICAL CONTRACTORS  
CONSISTING OF ITEMS OF NEWS, SHORT ARTICLES, PRACTICAL  
IDEAS, ETC., OUR READERS ARE INVITED TO CONTRIBUTE TO  
THIS DEPARTMENT

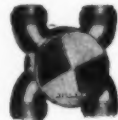


Type X

### A FITTING



Type GE



Type GECUU



Type GEM

FOR

### EVERY PURPOSE



Type GR



Type GRS



Type UF



Type UM

Listed by Underwriters  
Laboratories for use in  
Class 1, Group D locations



Mail this for Catalog EC

Killark Electric Mfg. Co.  
3940 Easton Ave., St. Louis, Mo.

Name \_\_\_\_\_

Address \_\_\_\_\_

### FURTHER REVISIONS IN CONTRACTOR'S CODE

To meet numerous objections raised by organizations other than contractors, the code of the electrical construction industry was rewritten by the N. R. A. and submitted at what was called a "post hearing" on October 26 and 27 to the code committee of the National Electrical Contractors Association.

It will not be possible to come to a final decision on the electrical construction industry code until the basic code of the construction industry has first been approved. The assistant deputy administrator would make no statement as to the probable time the electrical contractors' code would be approved other than to say that it was the intention of N. R. A. to push forward on all construction industry codes as rapidly as possible.

In the code as written by N. R. A. there were certain features which were unacceptable to the National Electrical Contractors Association code committee. These paragraphs have been rewritten to take out the objectionable features.

The greatest difficulty came in the definition of a contractor. In the N. R. A. version of the code the term "electrical contracting industry" included "the selling and rendering of the service of erecting, installing, altering, repairing, servicing or maintaining electric wiring, devices, appliances or equipment."

This was altered to read "the term 'electrical contracting industry' or 'the industry,' as used herein, is defined to mean the erecting, installing, altering, repairing, servicing or maintaining electric wiring, devices, appliances or equipment."

By eliminating the word "selling" the contracting industry is broadened to include everyone doing the work that a contractor does.

To further clarify the situation, the revised draft of the code now defines not only employees, but also electrical workers which term "shall include any person engaged in erecting, installing, altering, repairing, servicing or maintaining electric wiring, devices, appliances or equipment receiving compensation for his services, irrespective of the nature or method of payment of his compensation."

Because the word "selling" was included by N. R. A. in its definition of the contracting industry to meet the objections raised by other industries, its elimination necessitated certain exemptions. These exemptions applied to electrical work for telegraph or telephone companies in connection with their own service, and also to electrical work for power companies on generation and primary distribution or on the secondary system ahead of the meter where such work is for the power company as a part of the rendering of its service.

The revised draft, while maintaining a 40-hour week and a 60 cent minimum wage, attempts to meet the requirement of places where this minimum wage may be felt to be too low by setting up a policy for area agreements, whereby truly representative groups of employers and employees may, through collective bargaining, establish higher minimum wages and lower maximum hours for any definite region or locality. Such agreements shall be subject to the approval of the Administrator.

An attempt was made to provide

# The new

## "Variety-Lite"

***sells hundreds of jobs for lighting about the house and yard***



Porcelain enameled steel reflector; weather-resisting bracket. Complete with heavy rubber-covered cord and plug. Sizes, 100 and 200 watts. List \$3.25 and up.

Here is another Benjamin JOB MAKER. The most practical, flexible and widely useful lighting unit yet devised for doing an undreamed of variety of jobs about small commercial establishments, and the house and yard . . . a low-priced item that spells many new sales and installations with plenty of profit for the alert Contractor.



The special swivel bracket makes possible a wide range of mounting positions.

## « « Protect and Decorate With Light » »



Junior floodlights. Fixed-focus porcelain enamel reflectors give wide, even coverage at close range. Tilt up or down and turn in complete circle. Sizes, 75 to 200 watts.

Promote this two-way idea of selling light for protection and decoration of residences and small commercial establishments. It opens up a constantly growing opportunity for increasing your sales. Send for the book, "New Light on New Profits," which tells how to use these Benjamin units to get this business.

**BENJAMIN ELECTRIC MFG. COMPANY**

General Offices and Plant

**DES PLAINES (Chicago Suburb) ILLINOIS**

New York

San Francisco



Utility floodlights. Provided with focusing adjustment varying beam spread from 25 to 60 degrees. Non-tarnishing, aluminum alloy reflectors. Sizes, 150 to 500 watts.

# BENJAMIN

TRADE MARK

## These Ideas Will Help You Sell SANGAMO TIME-SWITCHES

The contractor who makes money today is a salesman. But to be a salesman he must have sales ideas and then present them logically to his prospects. Sangamo Time-Switches offer a sure way of making profitable sales. Look over the line and study the applications for these modern devices. Drop in at your jobber—he has Sangamo in stock—ask questions—he'll give intelligent facts regarding the applications of Sangamo Time-Switches in all of the 16 contractor markets. Here are four of the most common which offer you immediate Sangamo Time-Switch sales.



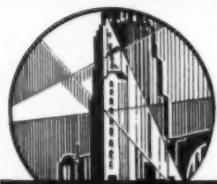
Apartment House Lighting Control

- This field offers you great opportunities. All apartment houses must have hall lights turned on at a definite designated time. A Sangamo Time-Switch will turn them "on" and "off" at the correct time. No forgetting—no dark halls—when it's done with an accurate Sangamo Time-Switch.



Electric Sign Control

- Profitable sales in the electric sign field are yours. Every outdoor sign is a prospect. The companies operating them save time, money, and avoid complaints if their signs and floods are automatically controlled by a Sangamo Time-Switch with Astronomic Dial. They never fail—summer or winter—rain or shine.



Floodlighting Control

- Short days and long nights bring building floodlighting. The wide-awake owner will want his building flooded. Sell him floodlights—make his building stand out from all others. It's good advertising, but keep him satisfied by properly controlling the "on" and "off" of his floods. Sell him Sangamo Time-Switches with Astronomic Dial.



Display Window Lighting Control

- Merchants want lighted display windows. They sell merchandise to the passer-by. These windows should be lighted only when prospective customers are passing. Count the people who pass his show windows from dusk to eleven o'clock. Tell him how he can direct attention to his windows. Then depend on a Sangamo Time-Switch for accurately controlled display window lighting.

**SANGAMO ELECTRIC CO.**  
SPRINGFIELD, ILLINOIS

for a 10 per cent increase in the minimum wage and a 10 per cent shortening of the hours after April 1, 1935. This provision was stricken out and does not appear in the revised draft.

The rules of fair competition remain virtually the same except that it is now mandatory that a member of the industry be generally qualified by technical training and experience, to have an established place of business, to maintain a proper set of books and records, and be financially able to operate his business properly. Contractors may participate in the benefits of the work of the Code Authority either by becoming members of the National Electrical Contractors Association or paying their reasonable share of the expenses of its administration.

To provide for electrical workers employed on transmission and distribution work and for process workers in electrical repair and service shops, a separate labor schedule is set up. The minimum wage rate is 40 cents an hour and the maximum hours 40.

### S. E. D. CLOSES DOORS

At a meeting of the board of directors of the Society for Electrical Development held on October 10, it was voted unanimously to cease all operations of the organization. A liquidating committee has been appointed to complete the process of winding up the affairs of the Society.

### SALES EDUCATION OF EMPLOYEES THROUGH BOOKLETS

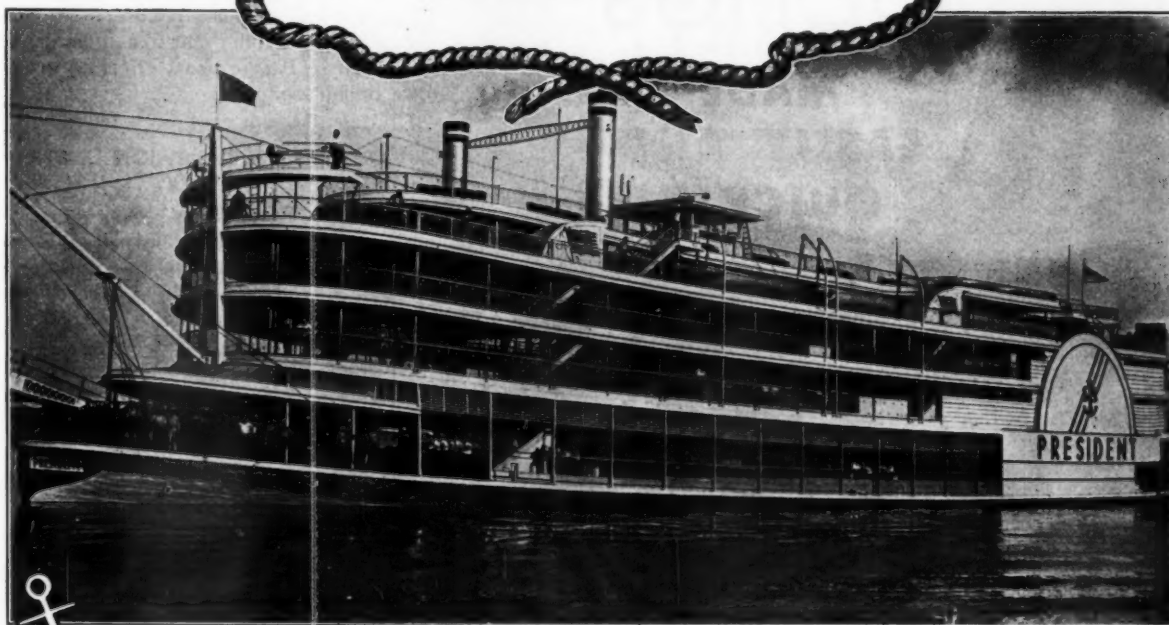
A plan of employee education through a series of monthly bulletins is announced by the Pacific Coast Electrical Bureau.

Manufacturers of appliances, wiring devices and electrical equipment, as well as wholesalers, utilities, contractors and dealers, are being asked to put into the hands of everyone of their employees a booklet each month which will educate the employee on a sales appeal for wiring or some kind of electrical appliance or service. These booklets are being furnished to subscribers at nominal prices. The first booklet is timed to go out December 1 and will be devoted to electrical gifts. The remaining eleven booklets in order of their appearance are to be devoted to: January, Wir-



# Steeltubes

## AFLOAT



40,000 feet of STEELTUBES installed in the beautiful Stokfus Steamer "President" by the National Electric Service Company, St. Louis, Mo.



Nowhere is there any other boat quite like the "President" with its luxurious appointments, its provisions for diversion and comfort, its gigantic open decks, and beneath its jewel-like splendor a sturdy all-steel construction.

More than 40,000 feet of Steeltubes Electrical Metallic Tubing was installed aboard the "President" to carry the wiring that serves the ten thousand lamps that provide illumination and beauty. Steeltubes was used because it provided adequate electrical and mechanical protection and showed a worth-

while saving in weight and shorter installation time.

Contractors can make certain that they receive this modern threadless rigid conduit only by specifying it by name—Steeltubes, and by so doing reap the full benefits incident to the use of this resistance electric welded conduit. And so this word of caution—make certain that the name Steeltubes appears on your requisitions for materials.

Write today for complete descriptive literature and the name of the nearest electrical supply house carrying Steeltubes Electrical Metallic Tubing in stock.



### STEEL AND TUBES, INC.

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . OHIO

A UNIT OF REPUBLIC STEEL CORPORATION



● Seldom, if ever, does an installation require a complete circular bend in the conduit, but if or when it should, Fretz-Moon Conduit would bend to this shape just as easily and as perfectly as it takes slight bends. • In the first place, Fretz-Moon Conduit is made of select-quality mild steel. Secondly, the continuous process eliminates burnt hard spots, and results in every length of conduit being truly uniform—ready for clean, free threading and easy bending. Thirdly, Fretz-Moon Conduit is coated on the inside with a special baked-on enamel that will not chip or crack under bending strain. The outside may be enameled, electro-galvanized or hot-dipped galvanized, all of which finishes resist severe bending and corrosive conditions. • Fretz-Moon Conduit has proved to those contractors who have used it that it bends much easier than ordinary conduit, and that it takes severe bends without flattening or distortion.

**Steel and Tubes, Inc.**  
CLEVELAND • OHIO  
EXCLUSIVE SALES AGENTS

**FRETZ-MOON**

**Rigid  
conduit**



ing; February, Lighting; March, Cooking; April, Air Conditioning and Ventilation; May, Appliances for Brides; June, Refrigeration; July, Home Laundry; August, Water Heating; September, Radio; October, Space Heating, and November, Sun-lamps.

The Pacific Coast Electrical Bureau states that the general plan has been submitted to electrical leagues throughout the country and to principal national manufacturers with the thought in mind that this might grow from a Pacific Coast effort to a national one.

#### LIGHTING CAMPAIGN UNDER WAY

The "Better Sight—Better Light" campaign got under way in a large number of committees as scheduled during the first week in October. Although this campaign is national in scope it has no single national program, each locality operating under its own initiative.

While in a great many places the work is largely that of filling sockets and selling larger lamps, there are a large number of cooperative programs built around lighting schools.

In a few cities where fall electrical shows had already been scheduled the better light program was tied in as a part of the public education.

All of the operating electrical leagues are working out cooperative efforts through meetings, schools and broadsides.

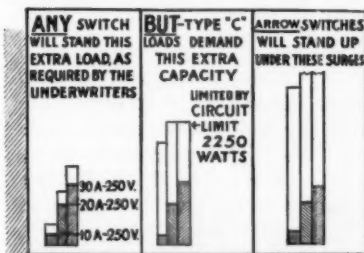
#### LOCAL CODE COMMITTEE NOMINATIONS

Acting for the National Code Authority to be appointed when the electrical construction industry code is approved, N. E. C. A. has sent out to all chapters a blank for nominations for local administrative committees. The members of these local committees will be appointed by the Code Authority when the code is approved from this list of nominees. These local administrative committees appear to be the most important link in the administration chain because upon such committees will fall responsibility for administering the code locally.

In cities where no chapter exists, the association has urged the members to form a chapter in order that

**EXTRA****Profit for You in the****! INDUSTRY LIGHTING CAMPAIGN !****SELL*****The Control Part  
of the Lighting Job*****TYPE C SWITCHES FOR TYPE C LAMP LOADS**

**Carry the ARROW Sales Kit**  
*to demonstrate the proper switch for each*  
**MODERN HIGH-INTENSITY LIGHTING CIRCUIT**



With this kit, the Contractor can ADD to his profits from the industry better-lighting campaign. When out on inspections and installations, you can show and sell the switches to go with the lamps. . . Tables in the cover of the box tell correct switch to use for each size and type of circuit. The carrying case (illustrated above) contains Type C Switches of 30 and 20 Amp. ratings; T-S 10 Amp. Switch and T-S 3-lever Combination. . . For full details of this lighting-sales tool, write us or consult your Jobber. " "

**ARROW ELECTRIC DIVISION**  
**THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.**



# MURRAY

## SAFETY SWITCHES

### A PRACTICAL SIZED

ALL-PURPOSE, GENERAL TYPE SAFETY SWITCH

No. 840



30 Amperes, 125 Volts, 2 Poles,  
1 Blade, 1 Plug Fuse, Solid Neutral

CABINET DIMENSIONS  
6 $\frac{3}{4}$ " Height, 4" Width, 2 $\frac{3}{4}$ " Depth

PLENTY OF KNUCKLE ROOM



## METROPOLITAN DEVICE CORPORATION

1250 ATLANTIC AVENUE  
BROOKLYN · NEW YORK

they might participate in the benefits to be derived from the administration of the code.

### PUBLIC EDUCATION IN ELECTRICAL SAFETY

Public interest in electrical safety was aroused in Kansas City during National Fire Prevention Week, October 8 to 14, through the cooperation of the Electric and Radio Association, the local inspection department, the fire department, the school-board and the Kansas City Safety Council. Home inspection sheets were passed out to 50,000 school children for the purpose of checking up hazardous conditions in the home. The sheets gave eleven instructions for fire prevention, two of which were electrical. Upon inspection a parent signed a card stating that inspection had been made and all faults corrected. These cards were then turned in by the children to their teachers.

The two electrical instructions were:

Inspect the electric wiring for breaks in insulation or for wires touching nails or metal objects. Wiring repairs or additions should be made by a licensed electrician.

Replace or repair extension cords found with loose connections or worn insulation. Caution persons against leaving current on electric irons or appliances when not in use.

During the same week the fire department made its annual city-wide fire hazard check-up filling out a report card for each premise visited. The electrical hazards which the firemen were to check and report were as follows:

Misuse of lamp cord, open wiring in conduit district, wires not on insulators, pennies behind fuses and other electrical defects.

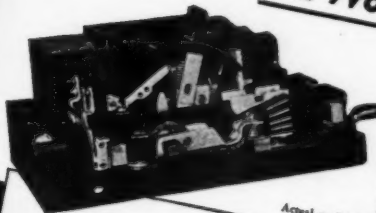
### PORTLAND INDUSTRY UNDERWRITES RANGE WIRING COST

The Electrical Contractors' Association, Portland, Ore., with its membership augmented to include a majority of the larger and better shops of the city, is cooperating with the Electric Refrigeration & Cookery Council of Oregon in a campaign on electric ranges in which wiring is offered to the customer for only \$10.00. All the other interests involved in the sale of ranges in the city including the distributors, dealers, utility companies, mutually

ADVERTISING  
that  
SELLS  
WIRING JOBS  
for you

One of the advertisements of the Westinghouse National Campaign that is stressing the advantages of Fuseless Circuit Protection to more than 61,000 buyers in Industrial Plants throughout the country.

## CUT CIRCUIT PROTECTION COSTS with Nofuze CIRCUIT BREAKERS



### Nofuze Breaker Advantages

- 1 **Ends Fuse Waste**—Eliminates fuse and lost time for men and machines caused by blown fuses. Time-lag study unnecessary service interruption due to momentary overloads.
- 2 **Increases Safety**—Trip-free handle and high interrupting capacity insure safety for operators. This breaker is approved by the Underwriters' Laboratories.
- 3 **Ends Tampering**—Cannot be bridged or over-loaded. Protection is positive.
- 4 **Saves Space**—Space requirements cut as much as 40 per cent.
- 5 **Lowest Maintenance**—Non-corrodible silver-silver contacts are used.



**Westinghouse**  
Quality workmanship  
guarantees every Westinghouse product

A supply of Check Books and a familiar Nofuze Breaker will be sent to you without obligation. Mail the coupon today.

If you are interested in new ways to reduce maintenance expenses, check the cost of your power and lighting circuit protection . . . the cost of your fuses, and the time that's lost for men and machines every time a fuse blows. This loss amounts to thousands of dollars yearly, even in medium-sized industrial plants.

The Westinghouse Nofuze Circuit Breaker eliminates this waste.

With it, anyone can quickly and safely restore service, by merely flipping the breaker handle. There is no delay . . . nothing to replace or renew. Its calibration is unchanging and tamper-proof, preventing the damage and expense often caused by bridged fuses.

The breaker's thermal-overload relay has a time lag that prevents tripping on short-time overload, thus ending unnecessary service outages.

Westinghouse Nofuze Circuit Breakers are approved by the Underwriters' Laboratories.

**Check your Blown-fuse Costs!**  
Prove to yourself that Nofuze Breakers will soon pay for themselves out of savings! Send the coupon for copies of the Fuse Check Book which makes it easy to keep an accurate record of blown-fuse costs.

**SEND FOR BOOKLETS**

Westinghouse Electric & Manufacturing Company  
Room 2-N—East Pittsburgh, Pa.  
Gentlemen: Please send me copies of your Fuse Check Book and your booklet on Nofuze Breakers.  
Name .....  
Company .....  
Address .....  
City ..... State .....  
MAY 11-33

THE advertisement reproduced above is one of a national campaign on Fuseless circuit protection for industrial plants that is paving the way to new business for you.

In leading industrial magazines and by mail, it is reaching plant managements right in your community.

It points out that obsolete circuit protection wastes thousands of dollars yearly in the average industrial plant and shows how Westinghouse Nofuze Breakers soon pay for themselves out of savings. It offers the Fuse Check Book with which fuse losses can be accurately checked . . . and a 16-page booklet describing the advantages of Nofuze Breakers.

# Westinghouse

Quality workmanship  
guarantees every Westinghouse product



Take advantage of the wide-spread interest aroused by Westinghouse advertising and the opportunity fuseless protection provides to get more wiring business.

See that your customers check their fuse costs and you've gone a long way toward landing a new wiring job with fuseless circuit protection.

The coupon will bring you complete information on Nofuze Breakers and samples of promotion literature.

## SEND FOR INFORMATION

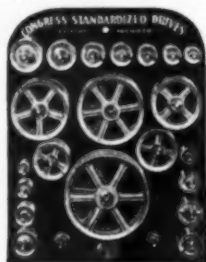
Westinghouse Electric & Manufacturing Company  
Room 2-N—East Pittsburgh, Pa.

Gentlemen: Please send me information on the plan for selling Nofuze Industrial Circuit Breakers.

Name .....  
Company .....  
Address ..... T 79700  
City ..... State ..... EC 11-33

## SOMETHING NEW IN STANDARDIZED PULLEYS & FLEXIBLE COUPLINGS

Now—for the first time—pulleys that are actually designed for specific belt use. You'll find these Congress Pulleys built to the belt for added driving efficiency and much longer belt life. They are made to fit A and B type belts—offer the last word in operating economy. Congress Pulleys are die cast from white brass—are accurately bored, perfectly balanced—completely vibrationless, with extra high tensile standards for high speed use. Available in all standard bores for round belt and V belt use—up to 10 inches in diameter. Also a wide selection of flexible couplings and crown face pulleys. Special descriptive catalog on request.



### DEALERS—DISTRIBUTORS

This large merchandising and display board contains 58 pulleys and flexible couplings in the most popular sizes. Get our special dealer proposition which insures quick turnover and large profits.

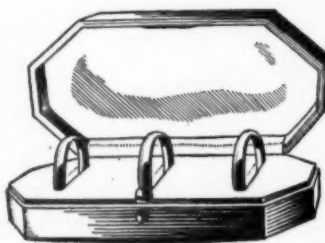
**CONGRESS TOOL & DIE CO.**  
8218 COLLINS AVENUE, DETROIT, MICHIGAN

## Unseen Value

The Three Ring Story by N. L. G.

**THREE** rings; one of brass gold plated; one 14 Karat gold and one of 18 Karat gold. On the surface they look the same but their intrinsic value is far apart.

Three rolls of tape to the casual inspection they look alike, but their real value differs greatly. An exhaustive test will show the difference. Another way to be sure you are getting the value that you pay for is to buy from



a reputable company. Tiffany would not sell you a brass ring as gold. Nor could you buy an inferior grade of friction or rubber tape from Okonite labeled as good tape. Our reputation is your safeguard. Panther Friction Tape and Dragon Friction Tape are good commercial tapes; buy them with confidence.



**Hazard Insulated Wire Works**

Division of

**The Okonite Company**  
Passaic, N. J.

agreed to absorb the balance of the wiring cost in accordance with definite pre-arranged amounts. All range wiring jobs created by the campaign are to be placed through the contractors' association which will allocate the work to its members in rotation.

### JOHN R. GALLOWAY

John R. Galloway, pioneer electrical contractor, past president and charter member of the National Electrical Contractors Association, died at his home in Washington, D. C., on October 16, after an illness of several months, at the age of 81.

Mr. Galloway was born in Baltimore County, Md., in 1852 and came to Washington in 1876. One of his first electrical contracts was for the



John R. Galloway

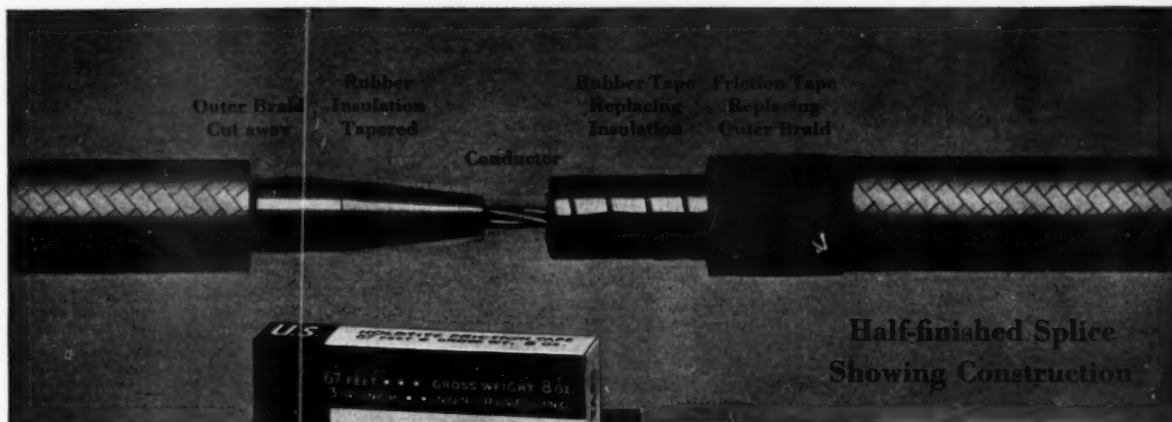
installation of a bell system in the Capitol Building to call members for a vote. He specialized in church lighting and fittings and installed electrical systems in many of the capitol's churches.

Mr. Galloway served as president of the national association in 1914-16. He was also for many years treasurer of the organization, and at the time of his death was one of the eight honorary members of the National Electrical Contractors Association.

He retired from business at the close of the World's War.



# A Workmanlike Splice



Half-finished Splice  
Showing Construction

A workmanlike splice *deserves* good tapes. Use "U. S." Relio Rubber tape and "U. S." Holdtite or Security Friction tapes.



**T**HE United States Rubber Company, world's largest producer

of rubber, offers you a line of tapes you can depend upon—tapes that insulate and hold as long as the wire itself.

Most of the better suppliers handle these tapes, but if your supplier cannot fill your order, won't you send us his name, or phone the "U. S." Branch nearest you, so we can take steps to assure you of prompt service in the future?

## United States Rubber Company

1790 BROADWAY  NEW YORK CITY

*Stocks in all Industrial Centers*

## PROFIT BY USING GREENLEE TOOLS

THE greater the efficiency of the tools you use, the more chance you have for meeting competition and for making a profit on each job. That is where Greenlee Conduit Benders and Knockout Tools come in. They cut costs on every job where they are used.



### Hydraulic Conduit Benders

Greenlee Hydraulic Conduit Benders insure profits because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire. They are easy to take to the job, too, because they are portable.



### Knockout Tools

Greenlee Knockout Punches and Cutters make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without any reaming or filing.

### Other Tools

Hydraulic Pipe Pushers  
Joist Boreers Bit Extensions  
Electrician Bits

Let Us Send Complete Information

**GREENLEE TOOL CO.**  
**ROCKFORD ILLINOIS**

GREENLEE TOOL CO.  
ROCKFORD, ILLINOIS

Please send complete information on the following:  
☐ Conduit Benders  
☐ Knockout Tools

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_  
My jobber is \_\_\_\_\_

11-93

## Manufacturers News

### ELECTRICAL CREDIT ASSOCIATION TO MEET NOVEMBER 16

The 38th annual meeting of the Central Division of the Electrical Credit Association will be held on Thursday, November 16, at the Congress Hotel, Chicago.

Sessions will be held in the morning and afternoon, followed by dinner in the evening.

### E. F. LENOIR JOINS THE LOUIS ALLIS CO.

E. F. Lenoir, formerly president of the Union Electric Manufacturing Co., has been appointed representative for The Louis Allis Company, with headquarters in Allentown, Pa.

### CHANGES IN GENERAL ELECTRIC BRANCH OFFICE PERSONNEL

General Electric Company, Schenectady, N. Y., announces the appointment of H. H. Blakeslee, formerly assistant manager of its New Orleans office, manager of the office to succeed B. Willard, who is retiring on pension.

J. W. Hicklin, heretofore manager of the Richmond office of the company, has been made manager of the Baltimore office, succeeding G. H. Gilbert. H. V. Whitney, formerly in charge of the general sales, territorial and building equipment sections of the industrial department in the Atlantic division of the company, has been appointed manager of the Richmond office.

Knox Porcelain Corporation, Knoxville, Tenn., has recently published Catalog No. 4, which is a 73-page booklet covering Knox products. The catalog describes knobs, tubes, cleats, telephone and radio insulators, ground clamps, fuse plugs, porcelain receptacles, sockets, porcelain lighting fixtures, neon sign insulators and wall bushings. Catalog is illustrated and contains dimensions and prices for each unit described.

General Electric Co., Schenectady, N. Y., has just published bulletin GEA-1784 covering its line of medium-size portable instruments, type AP-9.

## A NEW Tool

For Safely Testing Circuits and Pulling Fuses



Locating blown fuses and testing live circuits are hazardous tasks with the tools ordinarily used. With the introduction of the new Test Lamp—Fuse pull, made of Bakelite Molded, all danger is eliminated.

This device is a pincer-like tool completely encased in Bakelite Molded. When used for locating blown fuses the points in the end of the handle are brought in contact with two sides of the circuit, and if alive the Neon lamp in the handle will glow. When removing a fuse the tool is used as a pair of pliers. Because of the high insulation value of Bakelite Molded this new tool may be used around live circuits with safety.

### Other Products

Approved Copper Terminal Lugs  
Fuse Clips  
Solderless Cast Lugs

Ask your Jobber or write direct

**DANTE ELEC. MFG. CO.**  
BANTAM, CONN.



## A BALANCED LINE

**KNOX** is a "One Source of Supply"  
682 Items used in Wiring

New Catalog No. 4 is just off the Press  
Write for your Copy

MANUFACTURED BY  
**KNOX PORCELAIN CORPORATION**  
KNOXVILLE --- TENNESSEE

### BENFIELD HEADS STEEL AND TUBES NEW YORK OFFICE

Steel and Tubes, Inc., Cleveland, Ohio, announces the appointment of J. D. Benfield as New York district sales manager, succeeding Clyde F. Resseguie, who has resigned. Mr. Benfield will be located at the New York district office, 72-88 Scott Ave., Brooklyn, N. Y.

George W. Butler, formerly of the Kansas City office, replaces Mr. Benfield as Chicago district sales manager, and will be located at 1224 McCormick Building, and Henry Coward, formerly Detroit representative of the Harvey Hubbell Company, becomes Kansas City representative, working out of the Chicago office.

### MERRILL LEAVES APPLETON

Frank H. Merrill has resigned as vice president of the Appleton Electric Co. Mr. Merrill was connected with the Appleton company ever since its inception in 1903, with headquarters in New York City.

The Warner Elevator Mfg. Co., Cincinnati, Ohio, has issued a 4-page bulletin describing its newly developed Warner electric residence elevator. The bulletin contains illustrations showing the interior of elevator and motor, together with method of operation.

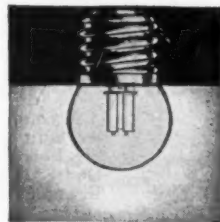
### LEWIS HEAD OF FAN MOTOR SECTION OF N. E. M. A.

P. Lloyd Lewis, manager of the merchandising division of Wagner Electric Corporation, St. Louis, Mo., is the new chairman of the Fan Motor Section of the National Electrical Manufacturers Association and at the annual meeting of N. E. M. A. Mr. Lewis was chosen by the section as its member of the advisory committee for the supervision agency of the appliance classification group.

Prior to his election as chairman of the Fan Motor Section, Mr. Lewis was secretary of the section for three years.

Mr. Lewis has been with the Wagner Corporation since 1911, serving as manager of the Kansas City office until 1930. In 1930 he was appointed manager of the merchandising sales division at St. Louis, which position he now holds.

## Complete Test Equipment for many jobs A NEON GLOW LAMP



0.5 - Watt Bulb G 10  
Supplied in 1.0 Watt size  
for 220, 230, 240 volts.

There are many types of testing where Neon Glow Lamps will serve as complete test equipment. Checking resistance and capacity, testing for grounds, shorts, voltage, polarity, frequency, and the determination of the grounded leg of a 3-wire system. Sizes of Neon Glow Lamps range from  $\frac{1}{4}$  watt to 3 watts.

They have a life of over 3,000 hours. New low prices extend their use to hundreds of applications where a low-cost, dependable, rugged lamp of low illumination level is called for.

Write for full details and suggested uses. General Electric Vapor Lamp Company, 867 Adams Street, Hoboken, N. J.

## GENERAL ELECTRIC VAPOR LAMP COMPANY

571 Copr. 1933, General Electric Vapor Lamp Co.

## UTILITY

WITH  
INTERDEPENDENT  
POWER

Model 89

**\$18**

LIST



### A revelation in Time Switch performance and value

Strictly motor powered; not self-winding. Dependable, accurate, despite current failures or frequency variations. Single pole mercury to mercury switch, 30 amperes, 120 volts, A. C.; dust proof case. Fully guaranteed.

Approved by Underwriters Laboratories.

Ask your Jobber or write

**WALSER AUTOMATIC TIMER CO.**  
Chrysler Bldg. New York, N. Y.

New easy way to  
make **EXTRA**  
**MONEY**



"We sold 15 elements the first week—we have installed Chromalox in nearly every store in the city using open type elements," writes Correll Electric Co., Linton, Ind.

**GO AFTER REPLACEMENT RANGE UNIT ORDERS** with Chromalox Units Clapp & Leach sold 54 units in 4 weeks. Altoona, Pa. dealer made \$136.50 in 2 months. Richmond, Va. contractor sold 48 units in 4 months, made \$187.20 profit. Chromalox replacement units are a money-making depression-proof item.

Range owners want to buy them. Easy to install, sizes to fit every make of range, old or new. Write for sure-fire sales plan already in use by dealers; Liberal discounts; free sales helps, etc. No obligation.

You can do it, too!

**MAIL WITH YOUR BUSINESS LETTERHEAD TODAY!** E. L. Wiegand Co., 7585 Thomas Blvd., Pittsburgh, Pa. Without obligation, send us complete data about Chromalox Super-Speed Replacement Range Units and how we can make money selling them. There are approx. .... elec. ranges in the territory we serve. Check which ( ) We sell elec. ranges ( ) We do not sell elec. ranges. ( ) Send us catalogs about Chromalox-equipped electric ranges.

Signed.....Position.....



# November New Products

## Electric Wall Heater

Frank Adam Electric Co., St. Louis, Mo., has placed on the market an electric wall heater for use in bathroom, bedroom, sewing room, etc., known as Quikhester. Heater is furnished with a 1500-watt nichrome wire heating ele-



ment and is designed as a convection type air circulating unit, taking cool air from the floor and moving it up through heating chamber with necessary velocity to circulate throughout the room. Embossed and perforated metal front is finished standard in satin chromium, dark oxidized copper and natural walnut wood. Size is 13 in. wide by 23½ in. high. Unit has polished metal frame open at bottom and formed outward at top; air space behind and both sides for additional air circulation; enclosing box made of 16 ga. galvanized steel; automatic tension adjustment for heating element and switch.



## Handy Floodlights

Several improvements in its line of handy floodlights have been announced by the General Electric Co., Schenectady, N. Y. In its exposition model an adjustable socket support is now being furnished to accommodate both 550- and 1000-watt general service incandescent lamps. When socket is fully in, 1000-watt lamp is in focus; when socket is fully out, 500-watt lamp is in focus. A 1500-watt hard glass lamp can be used with projector provided lens is removed. Other changes include a slightly increased gauge of aluminum casing and the use of a substantial hexagonal nut

to give positive clamping to standard mounting. Junior and senior model handy floodlights have been changed to have a velvet finished reflector. Spike mountings are also provided with standard bases for use in temporary mounting. Four ft. of cord and a plug are also supplied.

## Test Lite and Fuse Puller

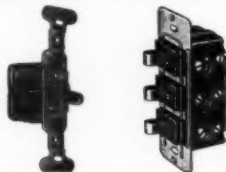
A combination test lite and fuse puller built in one unit known as "Test-lite-Fuspul" is announced by The Dante Electric Manufacturing Co., Bantam, Conn. The design of unit



represents a pair of pliers made of molded Bakelite reinforced by inserted steel. Test pins provided at end of each handle and by opening and closing, puller handles cause pins to span to all opposite polarities found in electrical circuits within its capacity. Overall length is 7 in. Manufacturers claim it will test circuits 110 to 550 volts, a.c. and d.c. and pulls fuses 30 to 100 amp., 250-600 volt sizes.

## Switches

A line of TS time-saver switches for type "C" lamp loads is announced by The Hart & Hegeman Division of the Arrow-Hart & Hegeman Electric Co., Hartford, Conn. Other features in ad-



dition to the type "C" lamp capacity are that the single switches fit standard wall plates; mechanism is fully enclosed and sealed in a Bakelite base, and base is small and compact. TS ready-wired switch combinations are made in any arrangement of two or three lever switches in a single gang and come assembled in one base ready for wiring. Bakelite plates are made for these ready-wired combinations.

## Push-Button Station

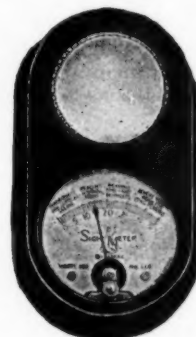
A start-stop push button station designated as Class 9001, type B20, has been placed on the market by the Square D Co., Industrial-Controller Division, Milwaukee, Wis. The push buttons are 1 in. diameter and buttons and stems are moulded of Bakelite in one piece and supported by strong compression springs with an additional follow-up spring at contacts. Contacts are silver to silver, double break. Mecha-



nism is mounted on a porcelain base and is removable as a unit from enclosure. Mounting dimensions are 2½ in. wide x 4¼ in. high x 2½ in. deep. Station is also built with dust and water tight enclosure.

## Rubber-Insulated Cable

Three new types of rubber-insulated cable, insulated with heat-, corona- and moisture-resisting compounds have been announced by General Electric Co., Schenectady, N. Y. Rubber insulation designed as type GE-R359 is designed to operate at a maximum not exceeding 75 deg. C. and is recommended for insulating cables for station, apparatus, transformer lead, motor lead and power applications where cable is required to be insulated with a compound which will stand much higher temperatures than standard grade of rubber compounds. It can be furnished with any type of finish. Type GE-R348 moisture-resisting compound is designed for use on cables which must operate in wet locations. Type GE-R351 is a corona- and moisture-resisting compound which is recommended on cable for high-voltage transmission, distribution, station, parkway, tree wire, serial, and similar applications.



## Sight Meter

The Sight Meter for measuring light is being offered for sale by The Sight Light Corporation, Chrysler Building, New York City. In addition to measuring light, the manufacturers claim it also indicates the minimum amount of light needed. It is an adaptation of a battery-less, photoelectric cell. Unit is of Bakelite material.

*Electrical Contracting, November, 1933*

The Melody Company, 2701 West Ave., 34, Los Angeles, Calif., has just issued a pamphlet describing Melody Chimes, which they are now manufacturing.

Ideal Commutator Dresser Co., Sycamore, Ill., announces that its Chicago office, located at 618 West Lake St., is now in charge of S. S. Callner.

A 4-page bulletin describing armored service entrance cable has just been published by General Cable Corporation, New York City. One page of this bulletin describes the construction of the cable and one page shows installation diagram.

### Classified Advertising

**Sales Agents Wanted**—To represent well-known manufacturer; must be experienced in selling armored cable and insulated wire. Box 1133, Electrical Contracting, 520 No. Michigan Ave., Chicago, Ill.

**Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912,** of Electrical Contracting, published monthly at Chicago, Ill., for October 1, 1933.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared S. B. Williams, who, having been duly sworn according to law, depose and says that he is the business manager of Electrical Contracting, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Electrical Trade Publishing Co., 530 N. Michigan Ave., Chicago, Ill.; editor, S. B. Williams, 530 N. Michigan Ave., Chicago, Ill.; managing editor, S. B. Williams, 530 N. Michigan Ave., Chicago, Ill.; business manager, S. B. Williams, 530 N. Michigan Ave., Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member must be given.) Electrical Trade Publishing Co., 530 N. Michigan Ave., Chicago, Ill.; Howard Ehrlich, 530 N. Michigan Ave., Chicago, Ill.; Edgar Kobak, Jackson Heights, L. I., New York.

3. That the known bondholders, mortgages and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown in (This information is required from daily publications only.)

S. B. WILLIAMS.

Sworn to and subscribed before me this 22nd day of September, 1933.

(Seal) Elsie E. Storer.  
(My commission expires December 18, 1933.)

## SHOW its Versatility!

Show how Wiremold answers every wiring problem from panel box to outlet

YOU don't have to be a high-pressure salesman to land business with Wiremold. There is a simple, sensible Wiremold answer to every problem—and the contractor who knows his Wiremold gets the job.

P.S. Show how "better-light" for "better-sight" is made practical and economical with Wiremold.

# WIREMOLD

HARTFORD, CONN.

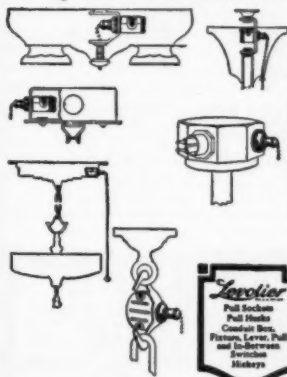


## Levolier

### THIN MODEL

## WINS!

—where Service and Adaptability Count



6 AMP.  
No. 41



The Levolver Thin model Switch No. 41 is an achievement in small switches. The above actual size picture shows it is less than  $\frac{3}{8}$  of an inch in thickness. . . In spite of its smallness, it retains all of the practical characteristics of the famous Levolver line. It is the smallest 6 amp. switch made.

At the left are shown six logical uses for this practical Levolver, which may be secured in three different stem lengths.

You'll make no mistake in ordering these Levolver Thin Model Switches

**McGILL**  
MANUFACTURING CO.  
Electrical Specialties of Quality

ESTABLISHED 1904  
VALPARAISO - INDIANA  
Box No. 670



## MINERALLAC PRODUCTS



HANGERS FOR CABLES &amp; CONDUITS

Easily the best for quick, low-cost installation work. Send for full details and costs.

1 Hanger without Porcelain Bushing. Spring steel; stronger, quicker, more compactly arranged.

2 Hanger attached to steel beam with bolt and nut.

3 Jiffy Clip—quicker, neater work at less cost.

4 Cable Joint or Pot-head Compound—8 grades for every system, underground or overhead.



JIFFY CLIPS



Insulating Compounds

**MINERALLAC ELECTRIC CO.**  
25 North Peoria Street, Chicago, Ill.

## SHERMAN SOLDERING LUGS



SIDE FORMING LUGS

**Sold through  
Jobbers**

**N.E.L.A.  
STANDARD**

SHERMAN SOLDERING LUGS are seamless—solder cannot leak out—give better conductivity.

SHERMAN HEAVY DUTY SOLDERING LUGS are made of best quality seamless copper tubing—dimensions accurate and are free from burrs and corrosion.

## SHERMAN FUSE CLIPS

Ferrule types carefully designed and accurately made. Made of special Phosphor Bronze, the only non-ferrous metal which retains spring temper while under tension for long periods. Knife blade types are made of heavy, special temper spring copper and give strong spring tension and perfect contact.



**H.B.SHERMAN MFG.CO.**  
BATTLE CREEK - - - MICHIGAN

## Index to Advertisers

A	
Appleton Electric Company.....	29
Arrow-Hart & Hegeman Electric Co., The .....	35
B	
Benjamin Electric Mfg. Company...	31
Burndy Engineering Co., Inc.....	44
C	
Congress Tool & Die Co.....	38
Crouse-Hinds Company .....	22
D	
Dante Electric Mfg. Co.....	40
E	
Electric Storage Battery Company, The .....	24
F	
Fretz-Moon Tube Co., Inc.....	34
G	
General Cable Corporation.....	25
General Electric Company..Back Cover	
General Electric Vapor Lamp Company .....	41
Graybar Electric Co.....	4
Greenlee Tool Co.....	40
H	
Hazard Insulated Wire Works.....	38
J	
Jefferson Electric Company.....	
.....Inside Front Cover	
K	
Killark Electric Mfg. Co.....	30
Knox Porcelain Corporation.....	40
M	
McGill Mfg. Co.....	43
Metropolitan Device Corporation....	36
Minerallac Electric Co.....	44
O	
Okonite Company, The.....	38
P	
Pass & Seymour, Inc.....	23
Plymouth Rubber Company, Inc.....	
.....Inside Back Cover	
R	
RCA Victor Co., Inc.....	26
S	
Sangamo Electric Co.....	32
Sherman Mfg. Co., H. B.....	44
SpeedWay Mfg. Co.....	44
Square D Company.....	2
Standard Transformer Co., The.....	44
Steel and Tubes, Inc.....	33
U	
United States Rubber Company.....	27, 39
W	
Walser Automatic Timer Co.....	41
Westinghouse Electric & Manufacturing Company .....	37
Wiegand Co., E. L.....	41
Wiremold Company, The.....	43
Y	
Youngstown Sheet and Tube Co., The .....	21

## BURNDY QIKLUG



*Installed  
in a minute  
with only a wrench*

**BURNDY  
ENGINEERING CO., INC.**  
305 EAST 45TH STREET, NEW YORK  
*Agents Everywhere*

## Put a SpeedWay Oiler on Every Motor

End "shorts," bearing replacements, kicks, complaints and free service. End oil waste, oil dripping. Cut oiling time to a fraction. Put a SpeedWay Constant Level Oiler on every motor you service or sell and make an extra profit. Each SpeedWay placed on a key motor will sell a dozen more. As our representative you can place SpeedWay Oilers with rated plants on 30-Day Free Trial, and let them sell themselves.

## Write for Agency Proposition

Write today for our sales proposition and full description of SpeedWay Oilers.  
**SpeedWay Mfg. Co.**  
1840 S. 52nd Ave.  
Cicero, Ill.



## "Standardize on STANDARD Transformers"

**ALL TYPES  
Indoor and  
Outdoor Service**

**Send for  
Descriptive  
Bulletin**

**STANDARD TRANSFORMER CO.**  
Warren - - - - - Ohio





**depend**  
**UPON THE**  
**WHOLESALE WHO RECOMMENDS**



**PLYMOUTH**

The wholesaler that carries and recommends Plymouth Tapes is conscious of the part that honest quality plays in electric wiring work these days.

Plymouth Tapes cannot and will not dry out. They have adhesive stamina way beyond those other tapes that merely appear to be sticky. Besides Plymouth Tapes have at least five pounds per inch of width greater tensile strength. They are made only of the finest fabric.

Plymouth quality has been proved in both laboratory tests and actual service.

The wholesaler that recommends Plymouth quality to you is most considerate of your progress and your profits.



Manufacturers  
 Since 1896

**PLYMOUTH RUBBER COMPANY, Inc.**  
**CANTON, MASSACHUSETTS**

*Leadership · Quality · Reliability*



## CONDUIT PRODUCTS

G-E WHITE  
RIGID CONDUIT  
·  
G-E BLACK  
RIGID CONDUIT  
·  
ELECTRICAL  
METALLIC TUBING  
·  
FLEXIBLE CONDUIT  
·  
BX  
·  
BraidX  
·  
FITTINGS  
·  
G-E FIBERDUC

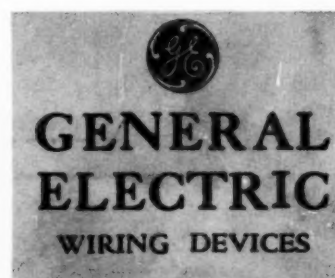
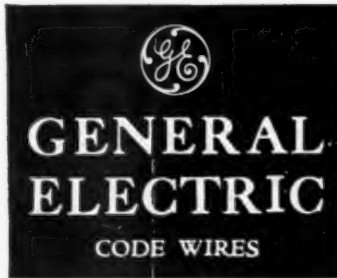
## WIRE AND CABLE

G-E "SAFECOTE"  
CODE WIRE  
·  
G-E LEADED CABLE  
·  
TELEPHONE WIRE  
·  
FIXTURE WIRE  
·  
TYPE "S"  
ALL-RUBBER CORD  
·  
LAMP CORDS  
AND PORTABLES

## WIRING DEVICES

SWITCHES  
·  
CONVENIENCE  
OUTLETS  
·  
PLATES  
·  
SOCKETS  
·  
FUSES  
·  
CORD SETS  
·  
CUTOOTS  
·  
ATTACHMENT PLUGS

**USE GENERAL ELECTRIC WIRING MATERIALS**



MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT



5